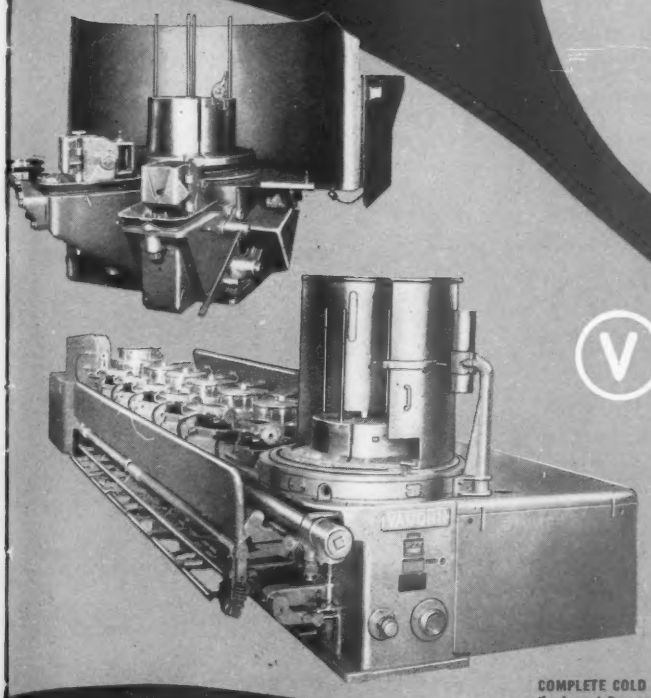
WIRE AND WIRE PRODUCTS

APRIL 1957

OVER
2,000
VAUGHN®
MOTOBLOC®
and
MOTOBLOX®

-are at work producing
TOP QUALITY WIRE
throughout the industry today



VAUGHN Motoblocs and Motoblox blanket the quality area of the wire industry—*on merit!* Decade after decade, the top advances in speed, cooling, flexibility and versatility have been set by Vaughn, and year after year the productivity of Vaughn equipment has paced the demands of its users. ● Planning expansion? Call Vaughn!

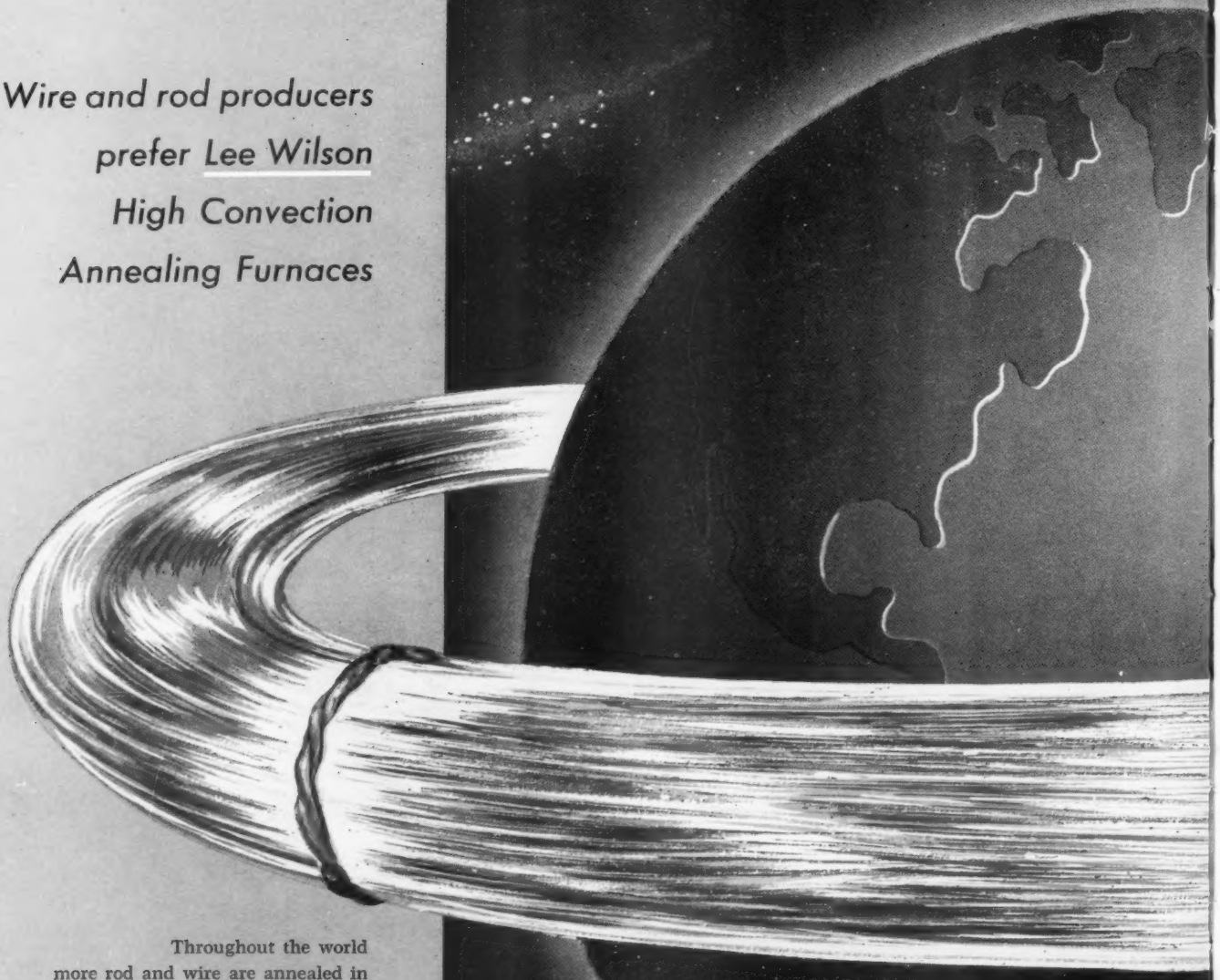
THE VAUGHN MACHINERY CO.
Cuyahoga Falls, Ohio, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

All around the World..

Wire and rod producers prefer Lee Wilson High Convection Annealing Furnaces



Throughout the world more rod and wire are annealed in Lee Wilson Furnaces than in all other makes combined.

Only Lee Wilson has the quick-heating "O" tube that brings the charge to temperature faster, more uniformly. The Lee Wilson design permits greater concentration of heat around the entire charge and tremendous velocities of hot gas movement within the furnace. And a specially designed diffuser assembly assures circulation down through the spiders to heat the coils from inside as well as outside.

If wire or rod processing is part of your business, be sure you have the finest annealing equipment. Join the leaders the world over and use Lee Wilson Furnaces.

Lee Wilson* ENGINEERING COMPANY, INC.

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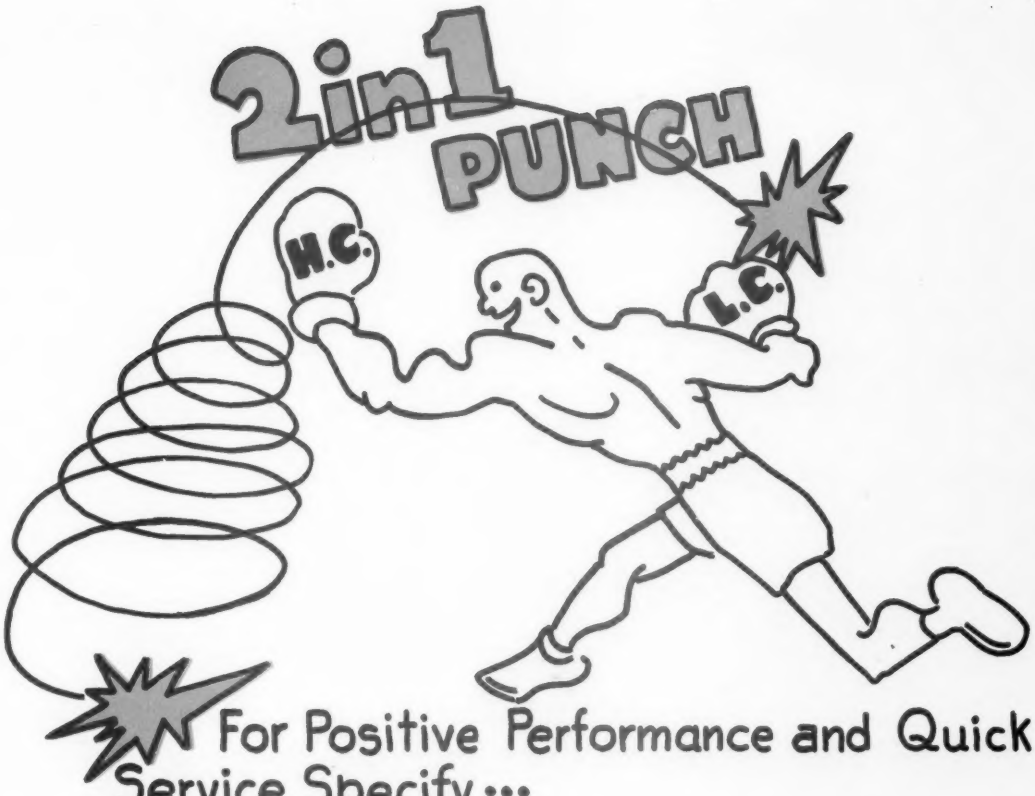
MAKE THE BEST METALS BETTER

*ORIGINATORS AND LEADING PRODUCERS OF HIGH CONVECTION ANNEALING FURNACES



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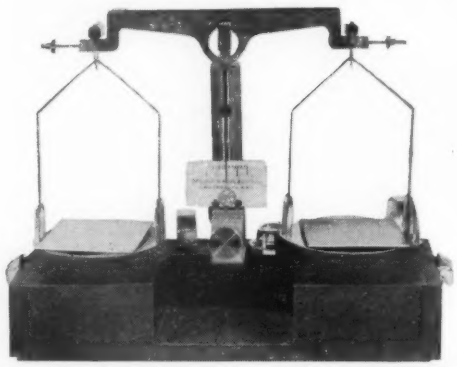
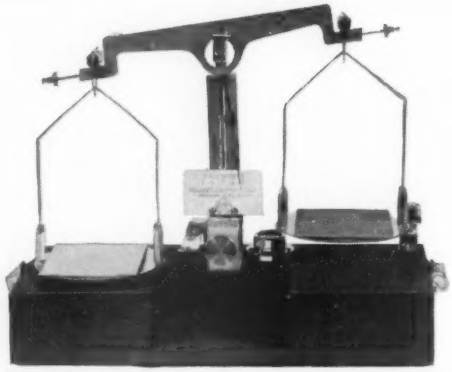


NO WEIGHT DIFFERENCE. Two identical panels of low-carbon sheet steel were used. They balanced the scale.

RODINE MINIMIZES ACID ATTACK. Each panel was placed in a beaker containing 10% by volume of 66° Bé sulfuric acid at 160°F. The acid in the right-hand beaker was uninhibited. The acid in the left-hand beaker was inhibited with Rodine 82, ¼% by volume of the concentrated acid. There was little or no hydrogen evolution in this beaker . . . Rodine retarded the attack of the acid on the base metal.



RODINE SAVES METAL. Both panels were removed from the acid pickle solutions after 5 minutes. The one pickled in the uninhibited acid had lost 1.4% of its original weight. The one pickled in the Rodine-inhibited acid had lost only 0.001%. This represents a saving of 26 lb. of steel for each ton pickled; and a simultaneous saving of nearly 50 lb. of 66° Bé sulfuric acid when Rodine is used to inhibit the acid.

ACP Rodine®

SAVES ACID, SAVES METAL— GIVES YOU MORE STEEL TO SELL

With ACP Rodine as the pickling acid inhibitor, you use less acid and have more steel to sell. Up to 50 lb. of acid is saved per ton of steel pickled and up to 26 lb. of steel. Fuming is practically eliminated. Formation of blisters and embrittlement is minimized. Costs of charging and cleaning of pickle baths are reduced—baths can be operated longer, and less acid is required to keep them at desired concentration. There are fewer rejects—steel pickled in acid inhibited with Rodine has uniformly clean, bright surfaces, free of pits, blisters and smut.

LEARN MORE ABOUT ACP RODINE. Bulletin 1381 tells the complete story. Write for your copy today.

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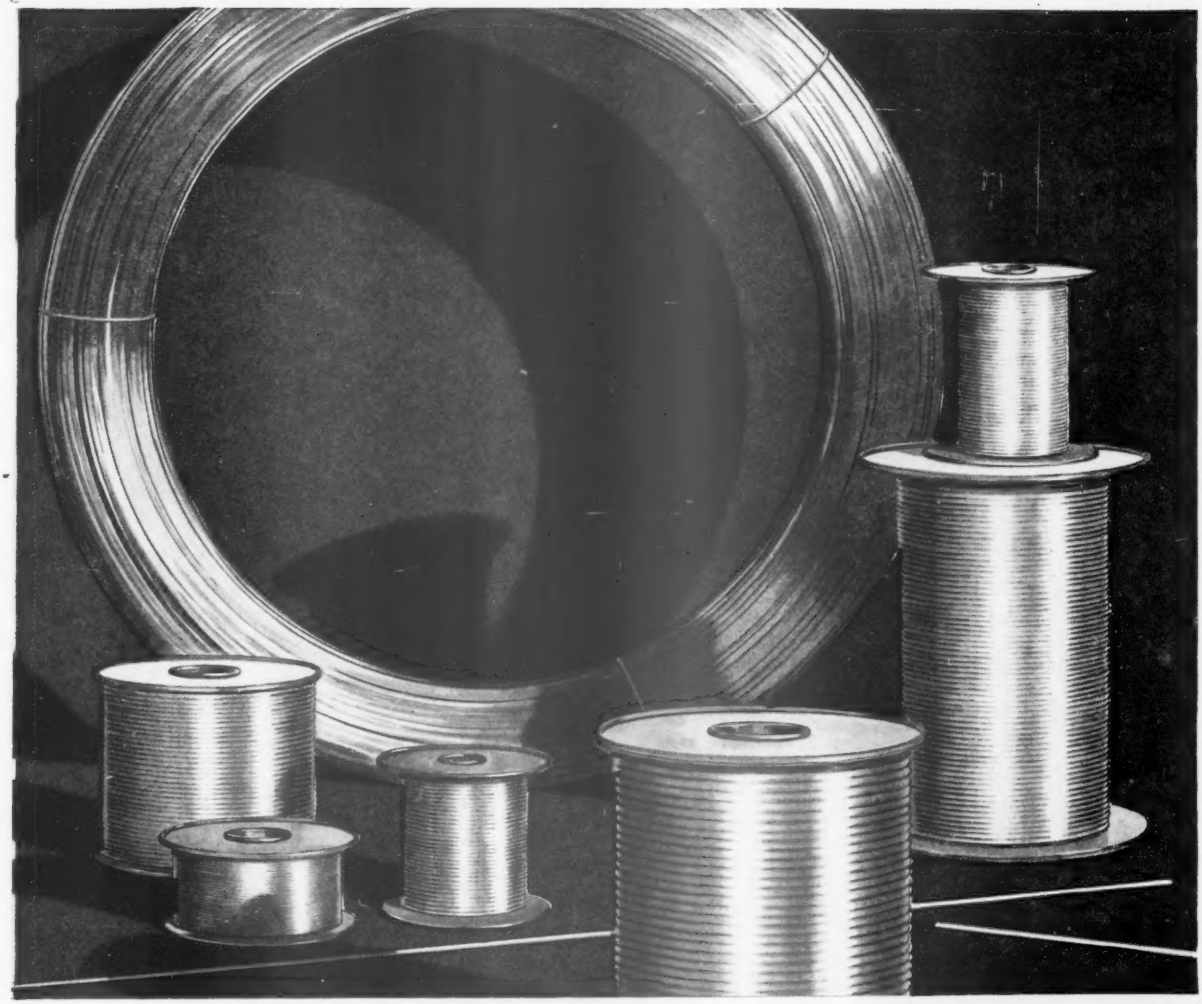

what CRUCIBLE offers stainless wire users . . .

Fuller Selection — Name the type of stainless wire you want and it will be available at Crucible, in the right grade and size. That's true whether you use cold heading, fine, spring, or shape wire. And Crucible stainless wire can be had in a variety of finishes, including bright and several metallic and nonmetallic coatings—full hard to dead soft—centerless ground or polished.

Specialty Mill Quality — You can be *sure* of Crucible quality, for we control every step of production from ore to furnace, to rolling of slabs and billets, to final wire drawing. What's more, Crucible is one of the largest producers of stainless for *all* applications.

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Dependable Delivery — Your nearby Crucible representative can either supply your needs from warehouse stocks, or arrange for prompt mill deliveries. You'll be dealing with a *steelman* qualified to offer sound, practical advice on wire and wire applications, if you ask him for it. And he's backed by the technical service of the nation's largest specialty steel organization. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

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No-slip storage principle and air-cooling permit speedy drawing.

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Exclusive air-cooling method removes heat from wire—insures meeting exacting specifications.

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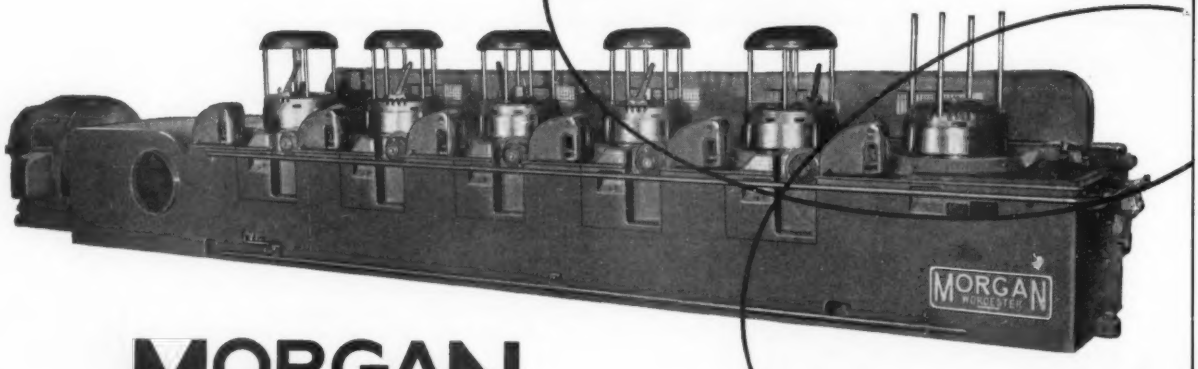

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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 32 April, 1957 No. 4

Designated as Official Publication By The Wire Association

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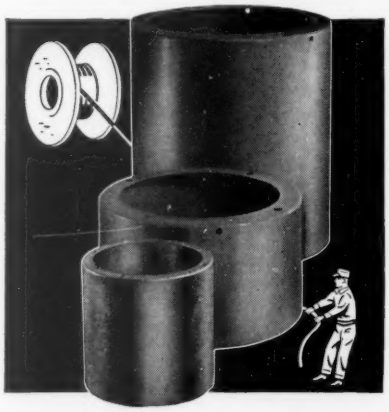

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With

NOPCO® KLY

a liquid fine wire drawing lubricant

Be sure to try Nopco KLY next time you're drawing fine size steel or fine and intermediate size copper wire. It's *different*—and everything different about it you'll find is a big advantage.

First, this emulsifiable oil mixes quickly and completely with water—hot or cold. This feature alone is enough to make it ace-high with you. But it has other advantages equally important.

Your bath lasts longer. Nopco KLY has a built-in affinity for water. Its lubricants stay *uniformly active* much longer, since the "drag out" of the lubricants from the solution is reduced beyond anything you've ever seen.

Prevents Formation of Insoluble Copper and Lime Soaps—both the copper soaps, which score dies, clog feed lines and screens; and the lime soaps you've been bothered with when drawing lime coated steel wire.

KLY may be used for high carbon, low carbon, limed, galvanized, and liquor finished fine steel wire—also for fine and intermediate copper, bronze, and brass wire. You'll surely want to try this die-saving, cost-saving lubricant soon. Write today for free booklet "Nopco KLY", which gives full instructions, lists percentages of fat in all emulsions.
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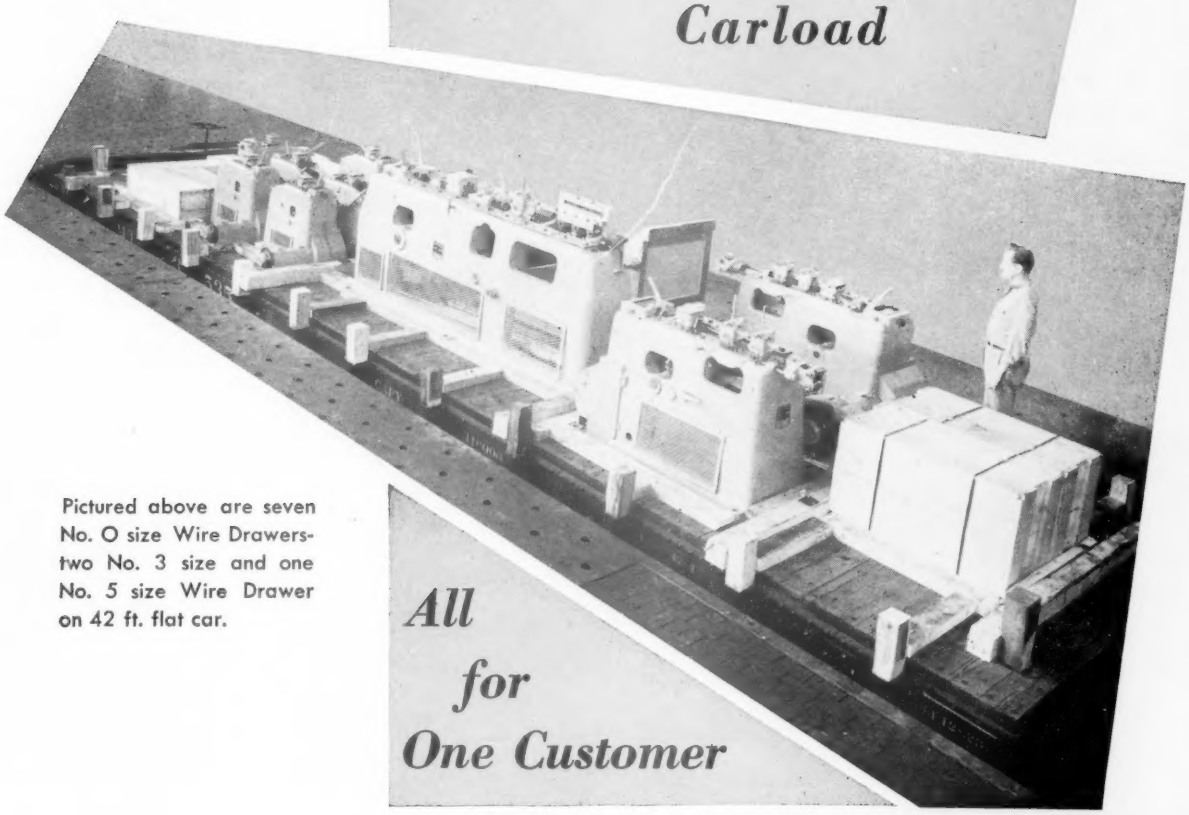
Ajax-Hogue

Wire Drawers by the Carload



Pictured above are seven No. O size Wire Drawers-two No. 3 size and one No. 5 size Wire Drawer on 42 ft. flat car.

All for One Customer

One of the larger cold heading plants will attach these **Ajax Hogue Wire Drawers** to ¼", ½" and ¾" bolt makers.

If you have cold headers or bolt makers you, too, can attach **Ajax Hogue Wire Drawers** to your machines and take advantage of **lower material costs - straight & accurate wire blanks - easier heading - Increased header die life and improved products.**

Write for Bulletin 111-A

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Tighter Coils For Better Springs

Co-owners Walter Pesaresi (left) and James Berg of Winamac Coil Spring examine coil of Pittsburgh Steel Oil Tempered Wire and a stock of coiled springs, ready for shipment.

Pittsburgh Steel's O. T. Wire Does Job For Winamac Coil Spring

When a spring-coiling job comes along so tough that many spring-makers dodge it, a satisfactory spring usually depends on combining human know-how with the right kind of quality steel wire.

A balance spring that supports the mower on a farm mowing machine presented such a problem recently to the Winamac Coil Spring Company in Winamac, Ind.

This is the story of how one man's knowledge of wire and spring-making produced a more than satisfactory spring on a difficult job.

The 16 9/16 inch long spring, coiled exceptionally tight and made of Pittsburgh Steel Company's Oil Tempered Wire, has 30 coils. Two and one-half coils at each end are passive. They hold a plug inserted by the farm implement manufacturer who buys the springs which support the weight of the mower on the tractor.

Springs often were rejected because of improper initial tension and burrs which interfered with insertion of plug ends.

Walter Pesaresi, co-owner and co-founder of Winamac Coil Spring Co. and a spring-maker all his life, credits three factors for his success in coiling the springs properly.

1. Selection of Pittsburgh Steel's Oil Tempered Wire.

2. Development of a new device which permitted tighter coiling.

3. Proper heat-treating techniques for stress-relieving the steel after coiling.

• **The Right Wire**—"Pittsburgh Steel's Oil Tempered Wire was a happy choice," said Mr. Pesaresi. "Its grain structure is right, it has a good surface, it's free from hard or soft spots and we can depend on it to hold uniformly to tensile strength specs."

• **Coiling Techniques**—Although Winamac Coil Spring has a hand-coiler matched by only three or four others in the country, Mr. Pesaresi found special techniques were needed to produce the balance spring with tight enough coils. To solve that problem, he designed and built a carriage and rollers that ride along the frame of the machine and guide wire on the mandrel. This device forces the wire being coiled tight against the wire just coiled. Exceptionally tight coils result.

• **Heat Treatment**—Coiling 21 feet

Balance spring is coiled on hand machine. It is equipped with a special carriage, designed and made at Winamac Coil Spring, which assures tight coiling.

Winamac uses other Pittsburgh wire than oil tempered. Here are tiny springs, made from music wire, for use in valves of Air Force oxygen masks.

Co-owner Walter Pesaresi examines finished balance spring, complete with plug which is inserted by customer who uses spring to support farm mower on tractor.

of .531 oil tempered wire into a 30-coil spring $16\frac{9}{16}$ inches long produces heavy stress in the wire.

That's why stress-relieving is necessary to impart exactly the proper physical characteristics.

In the mowing machine spring, stress relief is especially important. The spring is subjected to continuous flexing and must be capable of supporting widely varying shock loads throughout its full range of adjustments.

After study and experimentation, Mr. Pesaresi found stress relieving coiled springs for $2\frac{1}{2}$ hours at 500 degrees Fahrenheit provided just the right combination of time and temperature to give the springs long life in service.

• **Dependability**—Winamac Coil Spring has come to depend on Pittsburgh Steel for more than oil tempered wire.

Winamac uses music wire, supplied by the Johnson Steel & Wire Company subsidiary in Worcester, Mass., for automotive springs, appliance applications and for such uses as a valve spring for an Air Force oxygen mask. (Photo at left.)

"We found from actual experience," said Mr. Pesaresi, "that Johnson music wire was the only wire that held its dimensions uniformly."

Whether your operations call for oil tempered wire, some other type of manufacturers wire, or a fine wire specialty like Johnson's music wire, you'll find what you want at Pittsburgh Steel.

The fine, consistent quality of Pittsburgh wire holds down your production costs and builds customer satisfaction.

Trained Pittsburgh Steel engineers are readily available with counsel and wire know-how that will help solve your problems. You can get that help today by calling any of the Pittsburgh Steel district offices listed below.

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Chicago	Dallas	Houston	Philadelphia	Warren, Ohio
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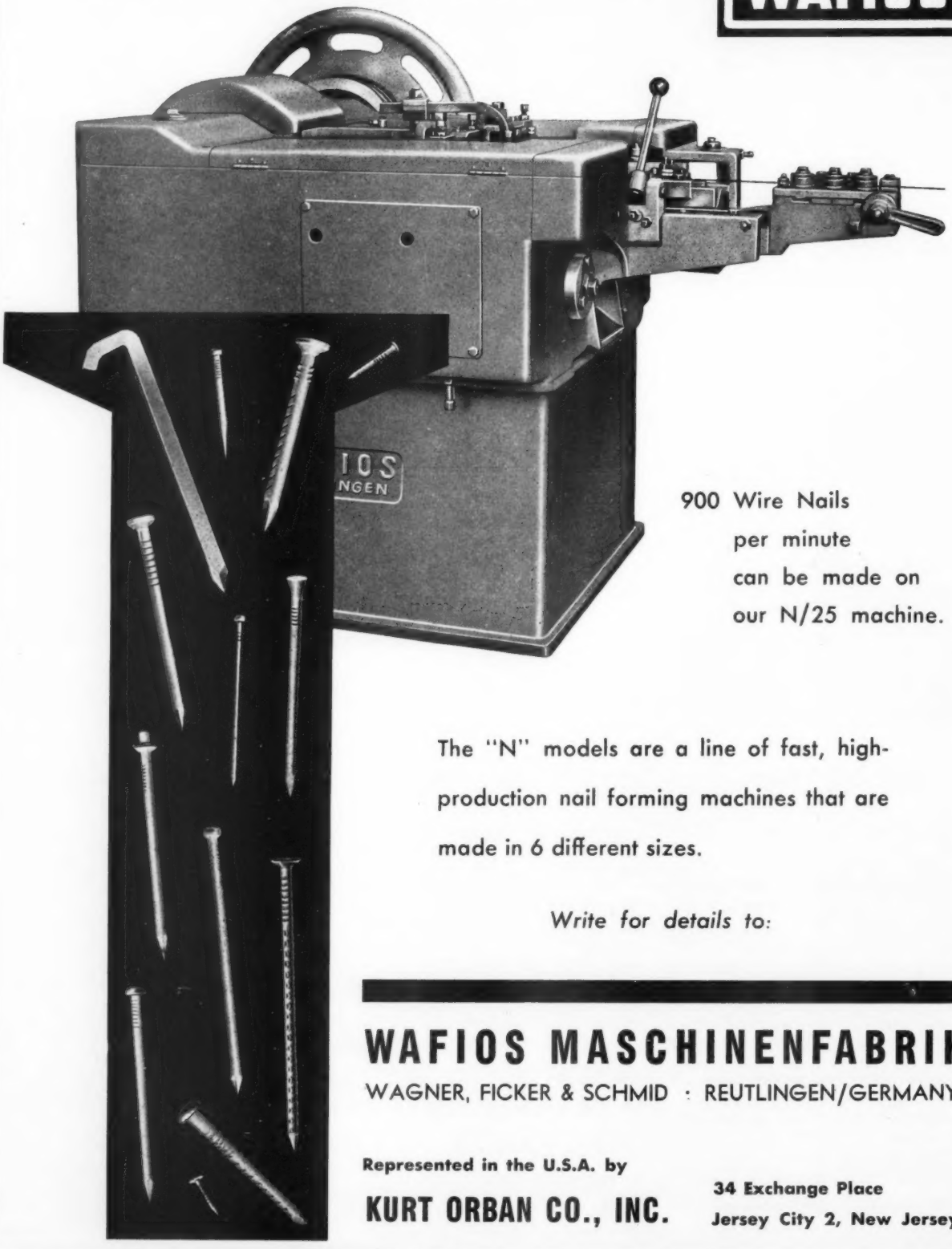
WAFIOS



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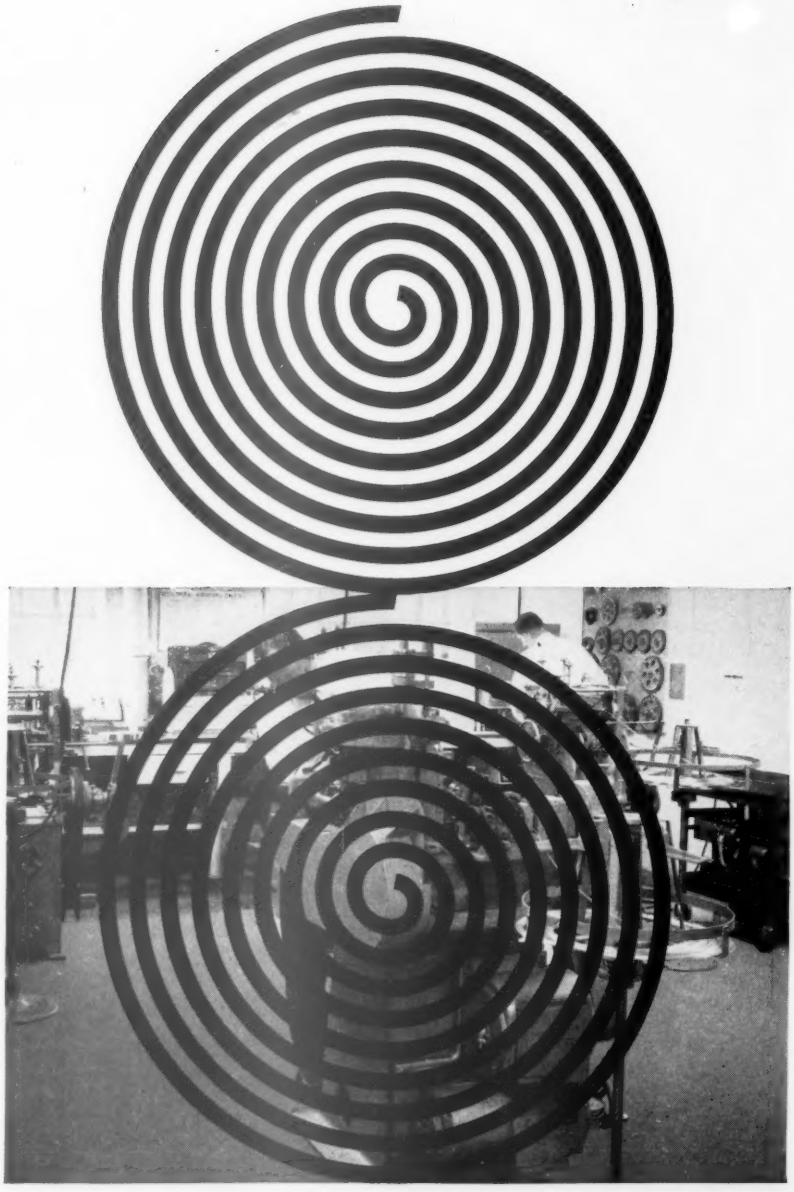

THE
TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT
VAN NUYS, CALIFORNIA · OAKVILLE, ONTARIO

Die used for blanking round can ends. The Kennametal cut edge die is shrunk-fit in the steel case, as shown in sectional drawing (black represents Kennametal, while gray indicates steel).

Cut edge dies of KENNAMETAL* increase production 60 times or more

The performance of hundreds of can lid dies of various sizes made of Kennametal average 60 times more lids than produced with steel dies. These dies cover a range of sizes, including ends large enough for gallon cans. This means less downtime on the die presses, high production rates, and minimum maintenance costs.

In one specific application, Kennametal dies and mating steel punches outperformed 35 previously-used steel die and punch sets before the first regrind was required. On another operation, nearly 800 million 3″ lids had been produced by the time .020″ of the stock had been ground from the original Kennametal cutting edge. These are typical examples of Kennametal cut edge die performance in plant after plant.

Choose Kennametal for your next die parts. With six grades in the "90 Series" and three grades in the exclusive "80 Series," for use where galling is a problem, there is a grade to meet the requirements of any die application.

A Kennametal die engineer will gladly work with you or your die maker in applying the correct grade of Kennametal for your dies. Call him at your nearest Kennametal office or write to KENNAMETAL INC., Latrobe, Pennsylvania.

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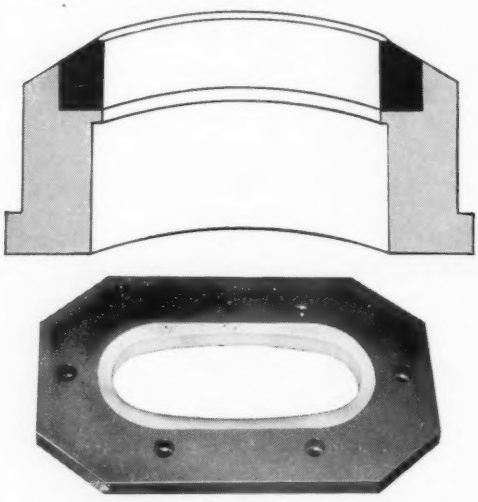
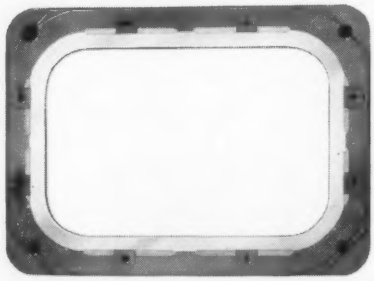
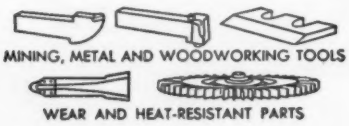


A one-piece Kennametal cut edge die is shrunk and pressed into steel casing.



A combination of shrink-fit of Kennametal cut edge die and mechanical holding lugs is used on this die for blanking one-gallon turpentine can bottom pieces.



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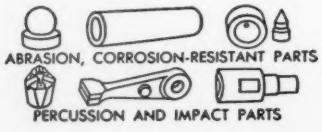

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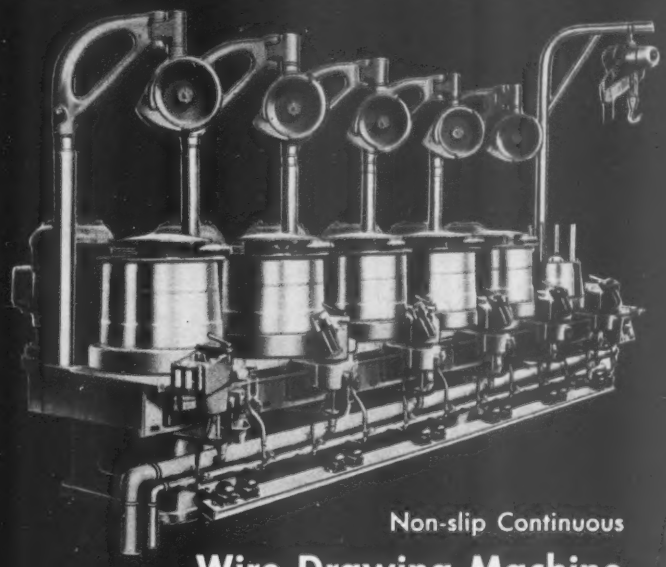

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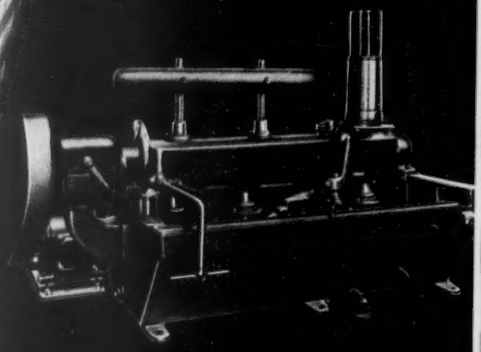

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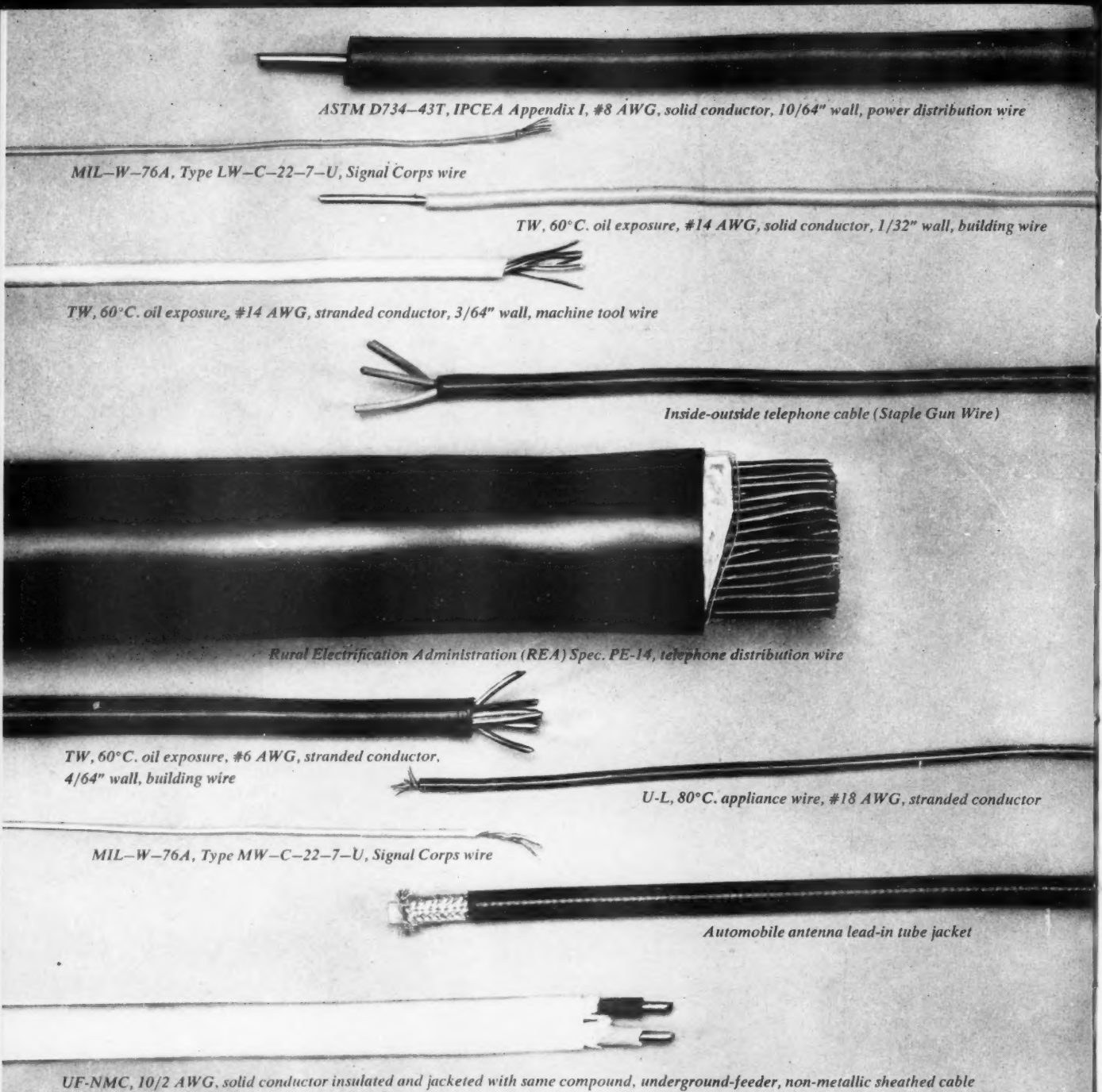

ASTM D734–43T, IPCEA Appendix I, #8 AWG, solid conductor, 10/64" wall, power distribution wire
MIL–W–76A, Type LW–C–22–7–U, Signal Corps wire
TW, 60°C. oil exposure, #14 AWG, solid conductor, 1/32" wall, building wire
TW, 60°C. oil exposure, #14 AWG, stranded conductor, 3/64" wall, machine tool wire
Inside-outside telephone cable (Staple Gun Wire)
Rural Electrification Administration (REA) Spec. PE-14, telephone distribution wire
TW, 60°C. oil exposure, #6 AWG, stranded conductor, 4/64" wall, building wire
U-L, 80°C. appliance wire, #18 AWG, stranded conductor
MIL–W–76A, Type MW–C–22–7–U, Signal Corps wire
Automobile antenna lead-in tube jacket
UF-NMC, 10/2 AWG, solid conductor insulated and jacketed with same compound, underground-feeder, non-metallic sheathed cable

One vinyl compound for all–versatile OPALON* 1038

Remarkable physical and electrical properties qualify OPALON 1038 for scores of uses

A single insulating and jacketing compound now gives outstanding performance on a wider range of wire and cable applications than has ever been practical before. It is available to you *without* a premium price!

A unique combination of high insulating efficiency, excellent heat resistance and extreme toughness is responsible for the all-purpose versatility of Monsanto Opalon 1038 vinyl compound.

Opalon 1038 is widely used for U-L Type T, TW and exposure to oil at 60° C., as well as for U-L 80° C. appliance wire.

To simplify inventory and stock control, the same compound is recommended for both primary insulation and jacket in UF-NMC, underground feeder and non-metallic sheathed cable. It is especially good for machine tool wiring.

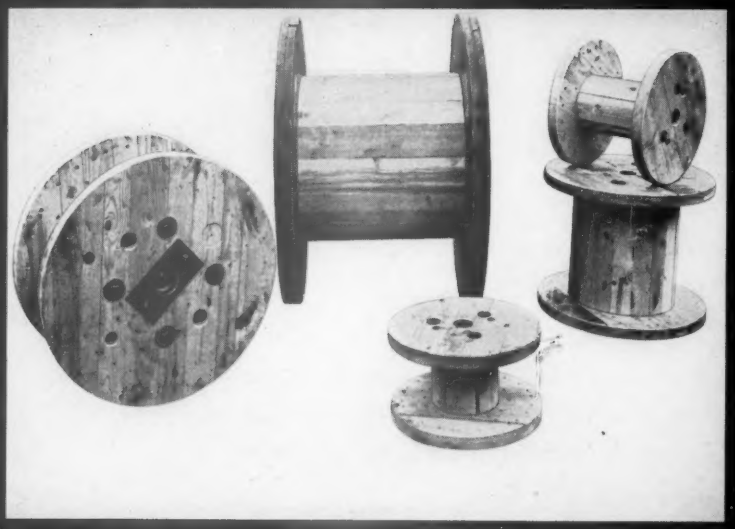
Rugged physical properties, including weather resistance and flame resistance, also qualify Opalon 1038 for insulating large-sized building wire (#6 AWG and over) and for cable jacketing.

All these applications have won appropriate recognitions from U-L, IPCEA, REA and Government agencies. For data sheets and complete information, write Monsanto Chemical Company, Plastics Division, Room 2006, Springfield 2, Mass.

MONSANTO

*OPALON, REG. U. S. PAT. OFF.

use
NON-RETURNABLE
wood
reels
for
all
sizes
and
types
of
electric
wire
and
cable



LOOK! at the ADVANTAGES

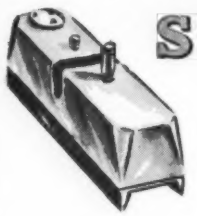
- REDUCED REEL INVESTMENT
- LESS STORAGE SPACE REQ'D.
- LOWER FREIGHT COSTS
- NO BOOKKEEPING
- NO REPAIR COSTS
- NO CASH DEPOSITS REQ'D.
- NO RETURN FREIGHT COSTS
- NO MORE HEADACHES!!!

NON-RETURNABLE REELS GIVE YOU A DEFINITE PACKAGING COST

HIGH SPEED
SHIPPING SERVICE in our . . . OWN TRUCKS
within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels in 5 days or less east of the Mississippi.

BRIDGE
MANUFACTURING COMPANY
HAZARDVILLE, CONNECTICUT
Telephone . . .
Thompsonville, Connecticut
RIverview 9-8308

"REEL GOOD . . .
Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.
WOOD REELS"



STANDARD OF THE INDUSTRY

MICROLIMIT CONTROL has earned this accolade from the insulated wire industry for its contribution to their needs for measurement and control of diameter.

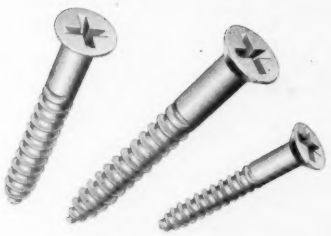
Evolution of the equipment to its present status is part of a long range planned program based upon the following objectives:

- To provide an equipment which performs an economic function.
- To give prime consideration to ease of operation and maintenance.
- To construct the circuitry in "building block" modules, so as to meet a wide variety of functional requirements at moderate cost.

Users include both the largest and smallest insulated wire manufacturers in the world.

For further information—

INDUSTRIAL GAUGES CORPORATION • WEST ENGLEWOOD, NEW JERSEY



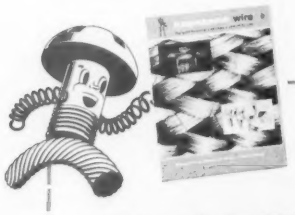
Satisfied customers for KEELER BRASS CO.

Keeler Brass Company, Grand Rapids, Michigan, keeps their customers satisfied by producing a premium quality product at lowest possible cost. Typical examples are their Cross Recess Screws shown here. They are carefully designed so that one driver fits the entire range of sizes. Slots are sharp and clean, threads and points are sharp and uniform. Surfaces are smooth.

Satisfied user of KEYSTONE "XL" WIRE

To efficiently produce their Cross Recess Screws, Keeler Brass Company depends on Keystone "XL" Wire. The reasons are many: cross recess punches turn out considerably more pieces per punch than were formerly produced with another wire. Rejects are 5% to 10% lower. Customer acceptance is up.

Flowability of Keystone "XL" Wire is the secret. "XL" is a wire of superior *flowability*—the result of careful specification of materials and manufacturing techniques.



Do you have difficult parts to cold head? Do you want to reduce your costs and improve the quality of your product? Keystone "XL" Wire may be your answer! A Keystone Wire Specialist will gladly analyze your needs and help you select the wire best suited to your requirements. Call, write, or fill in the coupon on the right.

Keystone Steel & Wire Company, Peoria 7, Illinois

KEYSTONE
WIRE FOR INDUSTRY

KEYSTONE STEEL & WIRE COMPANY
Peoria 7, Illinois

Mail coupon for free *COLD HEADING FACTS!* Discusses methods, technical facts, wire requirements and other data.

Name_____ Title_____

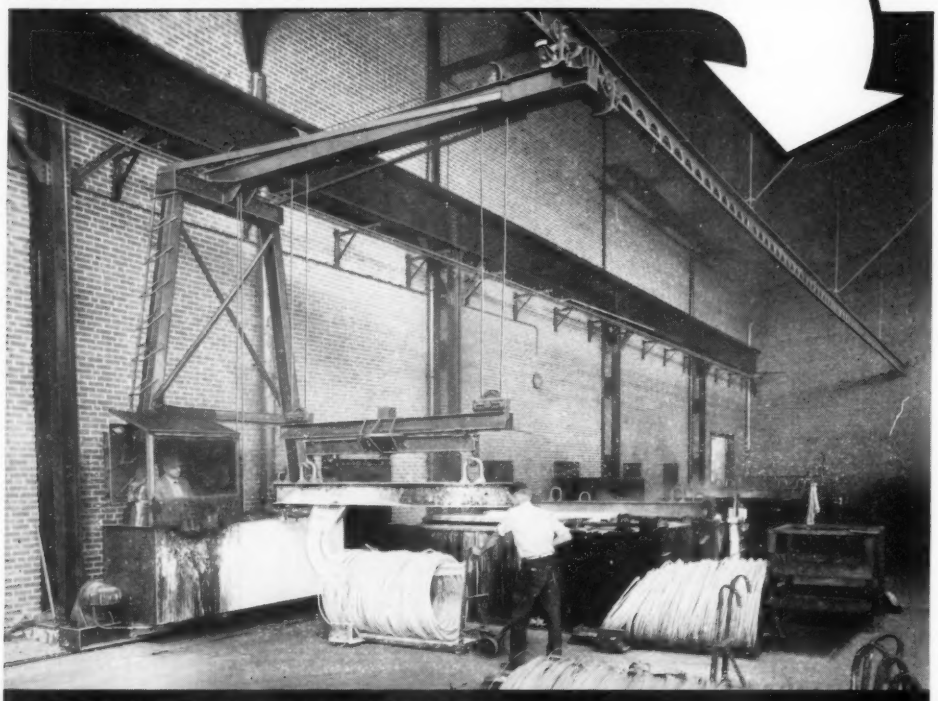
Company_____

Street_____

City_____ State_____

CUT ROD AND WIRE CLEANING COSTS

THE CLEVELAND TRAMRAIL WAY

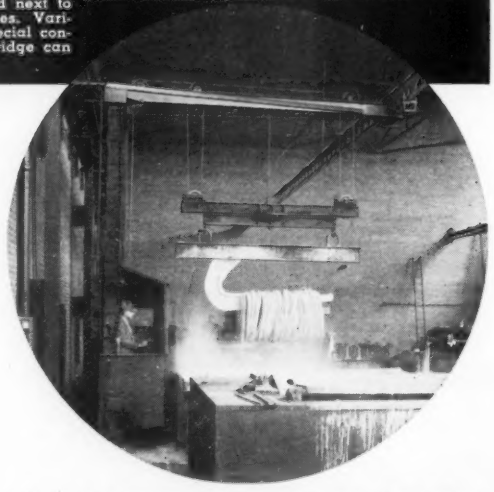


Hoisting machinery for this gantry crane is located next to operator's cab where protected from acids and fumes. Variations of this equipment have been built to suit special conditions. If desired, a movable trolley on gantry bridge can be furnished.

Nothing else that we know of can so cut costs and bring about other important advantages in a rod or wire mill, for the expenditure involved, as a modern Cleveland Tramrail cleaning house crane installation.

Cleveland Tramrail equipment completely revolutionizes cleaning house procedure and enables one man in the crane cab to run large tonnages through the cleaning cycle usually involving acid dip, water rinse, lime coating and baking. The equipment requires less than one-half the space for the old circular method and by the very nature of the layout used, a cleaner and more orderly room results.

The large number of installations now serving leading rod and wire producers attest to the advantages of the equipment. If you are interested in lower cleaning costs per ton by a method that quickly pays for the original investment, we suggest that you get the facts on Cleveland Tramrail cleaning house cranes.



3,300 lb. loads can be handled with this unit. Note the load bar is equipped with a swivel arrangement permitting turning the hook.

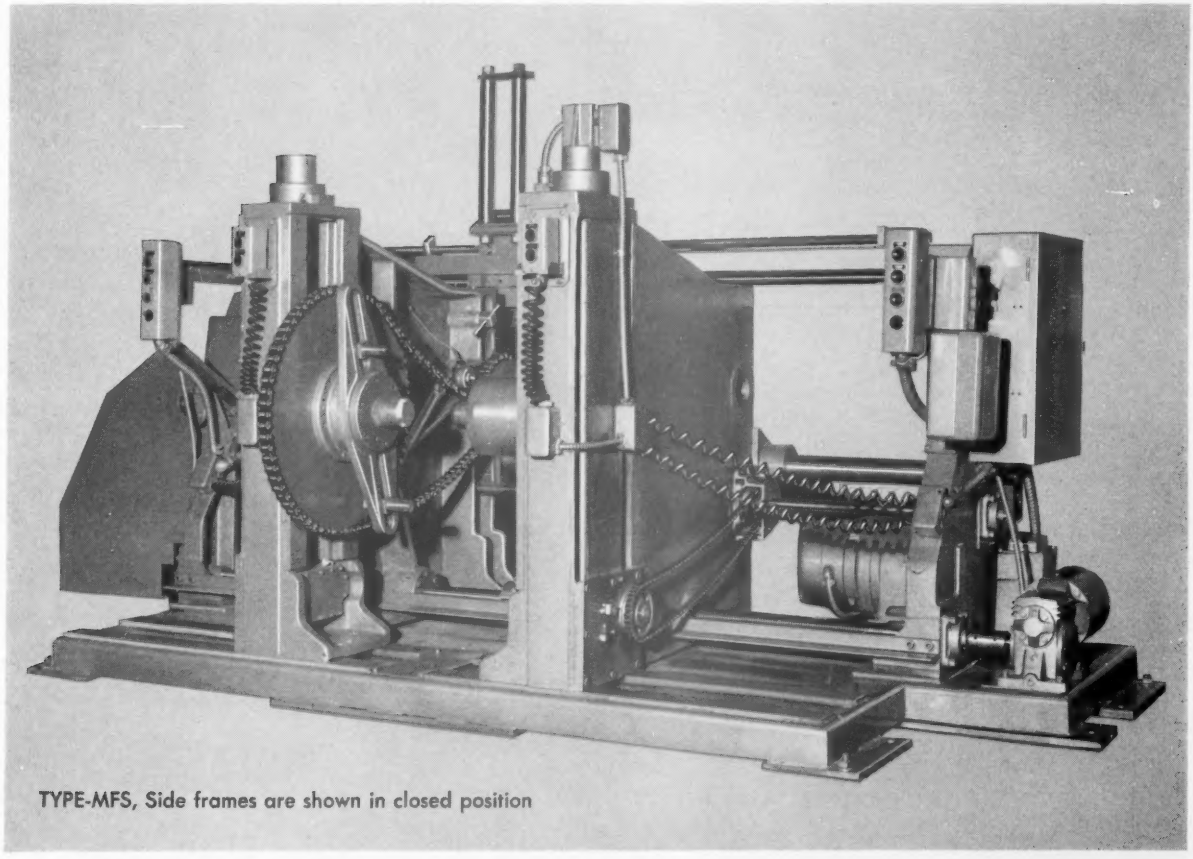
GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
9216 EAST 288th STREET, WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

NEW *ENTWISTLE* HEAVY-DUTY SHAFTLESS TAKE-UPS



TYPE-MFS, Side frames are shown in closed position

Feature Faster, Simpler Reel Handling, Larger Capacities, New Ease of Operation

Your productive line efficiency will take a sharp turn upward with one of the new Entwistle heavy-duty take-ups. Available now in standard sizes to handle reels from 30″-60″, 36″-72″, 36″-84″ and 48″-96″ in diameter and reel weights up to 12 tons.

By eliminating reel shafts and re-locating finger-tip controls, Entwistle engineers have succeeded in providing the natural answer to more efficient cable operation. This new ease of operation, along with the simplified reel handling, effect a *real saving in time,* especially in loading and unloading.

Motor driven lead screws operate the movable side frames for pick-up. Reel is always centrally positioned regardless of reel width. Independent twin motor driven lead screw raises reels to running position. Reel raising pintles mounted on dual taper roller bearings increase both thrust and radial capacities. Adjustable wire lay has traverse mechanism featuring hydraulically operated lead screws. Drive shaft provided to receive any plant drive. Any one of these new units can be converted to a shaftless pay-off with electric brake tension control. For further information, write or phone.

ENTWISTLE
Manufacturing Corporation
1475 ELMWOOD AVE., PROVIDENCE 7, RHODE ISLAND

Place Your Order NOW *for*

THE NEW AND REVISED 1957 EDITION OF THE WIRE and WIRE PRODUCTS BUYERS' GUIDE AND YEAR BOOK of THE WIRE ASSOCIATION

The many new headings, new products, address changes and other important information changes in the listings of sources of bars, rods, wire, wire products, electric wire and cable and of sources for machinery, equipment and supplies used in the Wire Industry, make this directory

INDISPENSABLE!

The Year Book Section is also completely new. It contains information to keep you posted on the affairs of THE WIRE ASSOCIATION, such as:

- OFFICERS AND DIRECTORS FOR 1957.
- LIST OF ASSOCIATION MEMBERS.
- LIST OF MEDAL AWARD WINNERS AND HONORABLE MENTION AWARDS.
- CONSTITUTION AND REVISED BY-LAWS.
- HISTORY OF ASSOCIATION ACTIVITIES, DURING 1956.
- INDEX TO ARTICLES AND SUBJECTS IN WIRE AND WIRE PRODUCTS FOR 1956.
- INDEX OF AUTHORS FOR YEAR OF 1956.

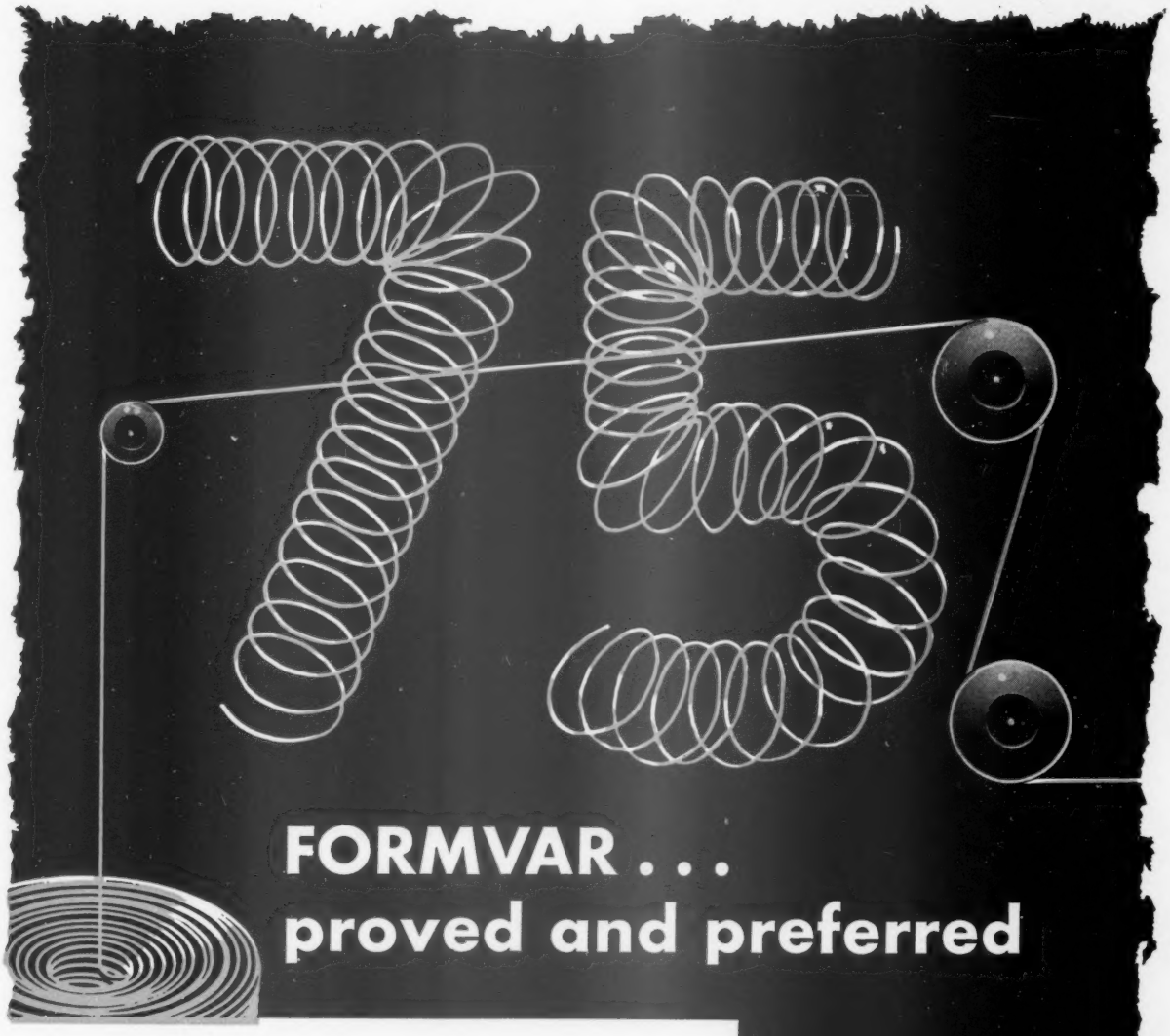
The Price: $5.00 Per Copy

Subscribers to WIRE AND WIRE PRODUCTS receive a discount of 40%. Association members receive a copy without additional cost, but may order extra copies at $3.00 each.

Keep yourself up-to-date. Send your order today to

WIRE AND WIRE PRODUCTS

453 MAIN STREET ● STAMFORD, CONN.



FORMVAR . . .
proved and preferred

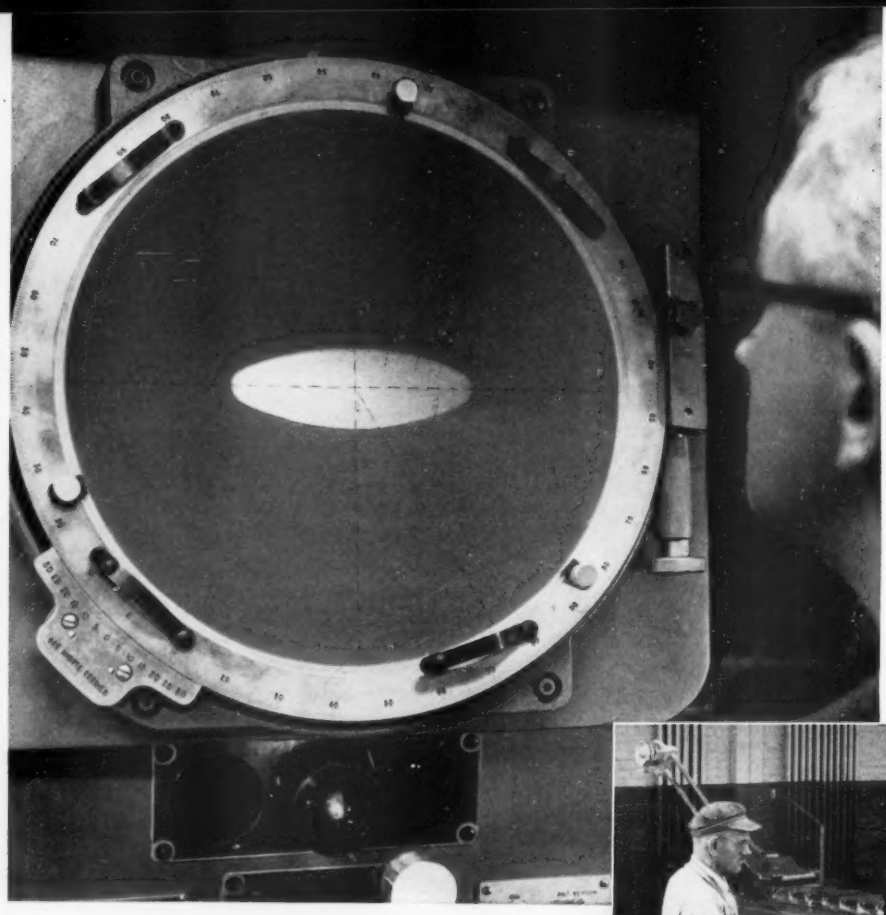
Approximately 75% of all magnet wire used today is coated with Formvar-phenolic enamel. Wire enamellers, motor manufacturers and motor users rely on Formvar in their processes and on their products. Formvar has proved its value and has established a long record of dependability.

Formvar is the registered trademark for polyvinyl formal resins produced and sold only by Shawinigan Resins Corporation. When combined with a phenolic resin it becomes that tough, heat resistant wire enamel popularly known as "Formvar enamel" . . . the industry standard.

Extension of this distinguished record is the purpose of Shawinigan's exacting production controls and active research into variations of the basic formulæ. A recent example of progress in this area is the combination of Formvar and isocyanates for low temperature solderability. Look to Shawinigan and Formvar for further progress. Shawinigan Resins Corporation, Department 5304, Springfield 1, Massachusetts.

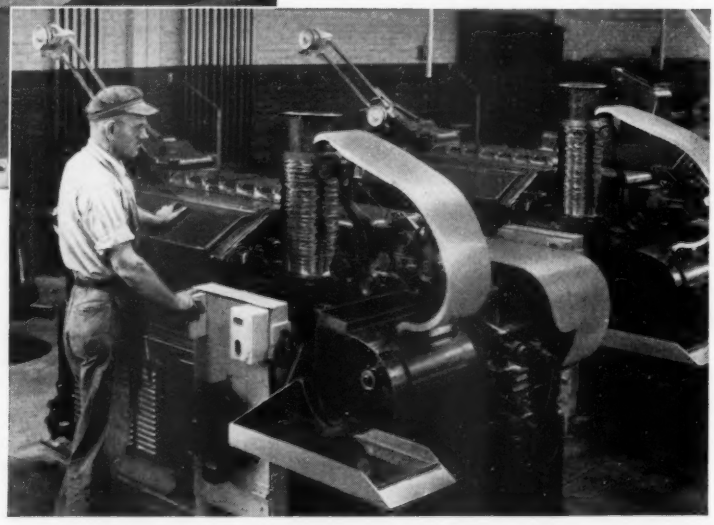
FORMVAR® *for wire enamels by . . .*

SHAWINIGAN RESINS



A sample of oval wire is checked for accuracy by an inspector as he studies the image, here magnified 20 times, on an optical comparator.

This battery of continuous, wet-drawing machines is typical of our new facilities for producing fine wire. Note that the machine in the foreground is spooling fine wire as it comes off the block.



Shaped wire and fine wire— Bethlehem specialties

There's nothing "run of the mill" in making shaped and fine wire. That's why we have expanded and re-grouped a special division of our rod and wire mill at Johnstown, Pa. It's our Fine and Specialty Wire Department," in which we now have a variety of brand-new equipment of the most modern design. It's our latest step towards specializing in the making of fine, flat, and shaped wire.

We're now drawing fine wire to sizes as small as 0.007 in. (40 gage). And we can furnish fine wire with liquor, white-quor, coppered, and other finishes, including redrawn bethnized—electrolytically coated with 99.9-per-cent pure zinc. We have the equipment to offer fine wire in a wide range of spool sizes. And we have the heat-treating facilities, drawing blocks, and other equipment to provide a wide variety of tempers and physical properties.

We regularly make flat, square, octagon, hexagon, oval and an increasing number of other shapes. Shaped wire offers many advantages to the fabricator. For example, oval wire has more surface than round wire of the same cross-sectional area. This feature, for example, is useful in reinforcement applications where the greater surface area improves cohesion between the material to be reinforced and the steel wire itself.

We've never been in such a good position to offer prompt delivery of shaped and fine wire in production quantities. The nearest Bethlehem sales office will give you the details. And you can be sure that our people in the mill, as well as in the sales office, will work with you all the way.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

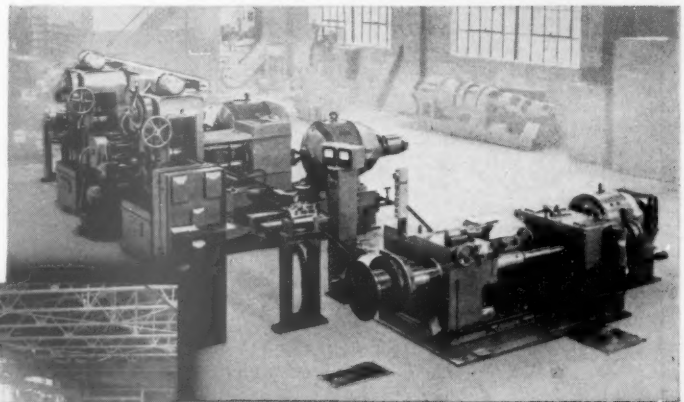
BETHLEHEM STEEL

BETHLEHEM STEEL

Waterbury Farrel Wire Flattening MILLS IN ACTION

Pictured here are a few of the many Wire Flattening Mills designed and built by Waterbury Farrel. Each installation was custom-engineered to fit the production requirements of each individual customer.

Whether your requirements call for a single or multiple stand mill, Waterbury Farrel can supply you with a reliable production unit that will prove to be a profitable investment.

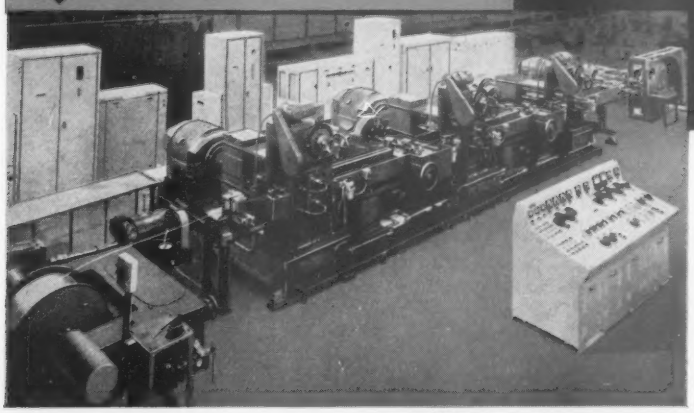


Two Stand Tandem Wire Flattening Mill at National Electric Coil Co., Columbus, Ohio. Speeds up to 1000 feet per minute.

Two Stand Tandem Wire Flattening Mill recently installed at John A. Roebling's Sons Corp., Trenton, N. J. Speeds up to 1500 feet per minute..

Three Stand Tandem Wire Flattening Mill in production for Anaconda American Brass Co. Ltd. (Subsidiary of the American Brass Co.) New Toronto, Ontario, Canada. Speeds up to 1800 feet per minute.

Three Stand Tandem Wire Flattening Mill installed at General Electric Co. in their Pittsfield Works. Speeds up to 2500 feet per minute..

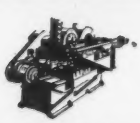


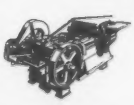
Write today for your free copy of Wire Flattening Mills, Cir. No. 731-R.

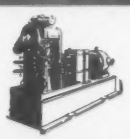
WATERBURY FARREL

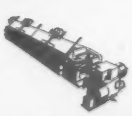
THE WATERBURY FARREL FOUNDRY & MACHINE CO. Waterbury, Conn.

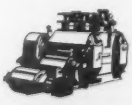
Sales Offices:
Chicago • Cleveland • Millburn, N. J.







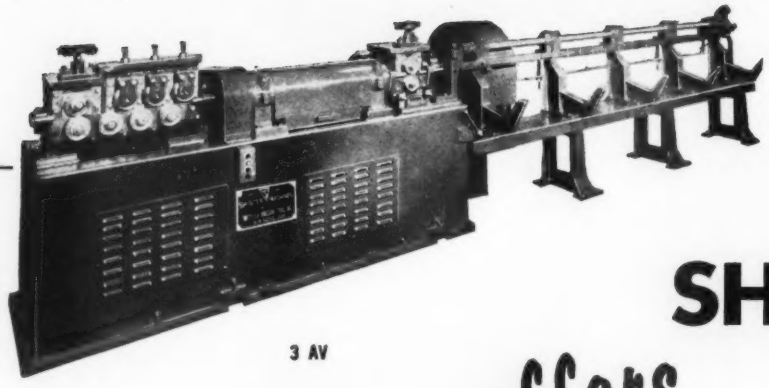




Bolt, Nut & Screw Machinery • Power Presses • Rolling Mill Machinery • Wire Mill Equipment • Sendzimir Mills and other Special Machinery

WATERBURY FOUNDED 1851 FARREL

WF-32



3 AV

90th year

SHUSTER offers most!!

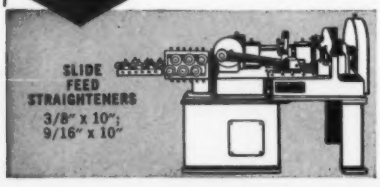
In Wire Straightening and Cutting, SHUSTER variable speed machines consistently provide the newest tested principles of operation – SHUSTER'S 90 years' know-how will cut your wire straightening and cutting costs every day!

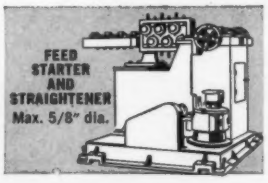
	SHUSTER	Manufacturer B	Manufacturer C	Manufacturer D
Infinite variable speed of all feed and cutoff ranges	YES	NO	NO	NO
Electrically controlled Target and Clutch	YES	Some Models	NO	NO
Power Consumption	LOW	HIGH	MEDIUM	HIGH
Complete On-The-Job Engineering service	YES	NO	NO	NO
Flat and Shape Stock Machines available	YES	YES	NO	NO

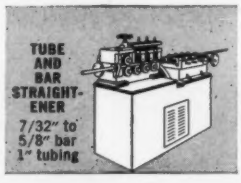
SHUSTER – the *first* name (since 1866) in Wire Straightening and Cutting, offers *more* production features, at less investment and operating cost, than have ever been available in the field!

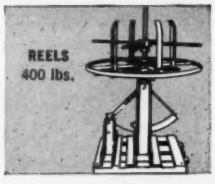
METTLER
MACHINE TOOL, INC.
155 West Adeline Street, New Haven, Conn.

This too is SHUSTER.









NATIONAL WIRE

(COLD ROLLED)

in Coils or Straight Lengths

COMPLETE METALLURGICAL SERVICE

Manufacturers of

SPRING WASHERS	RETAINING RINGS
ROUND EDGE FLAT WIRE	KEYSTONE SHAPED WIRE
SQUARE EDGE FLAT WIRE	SPECIAL SHAPED WIRE

Shaped Wire in Coils or Straight Lengths, Ferrous or Non-Ferrous.

LARGE OR SMALL QUANTITIES

Manufactured by

THE NATIONAL LOCK WASHER COMPANY

PRECISION SHAPED WIRE DIVISION

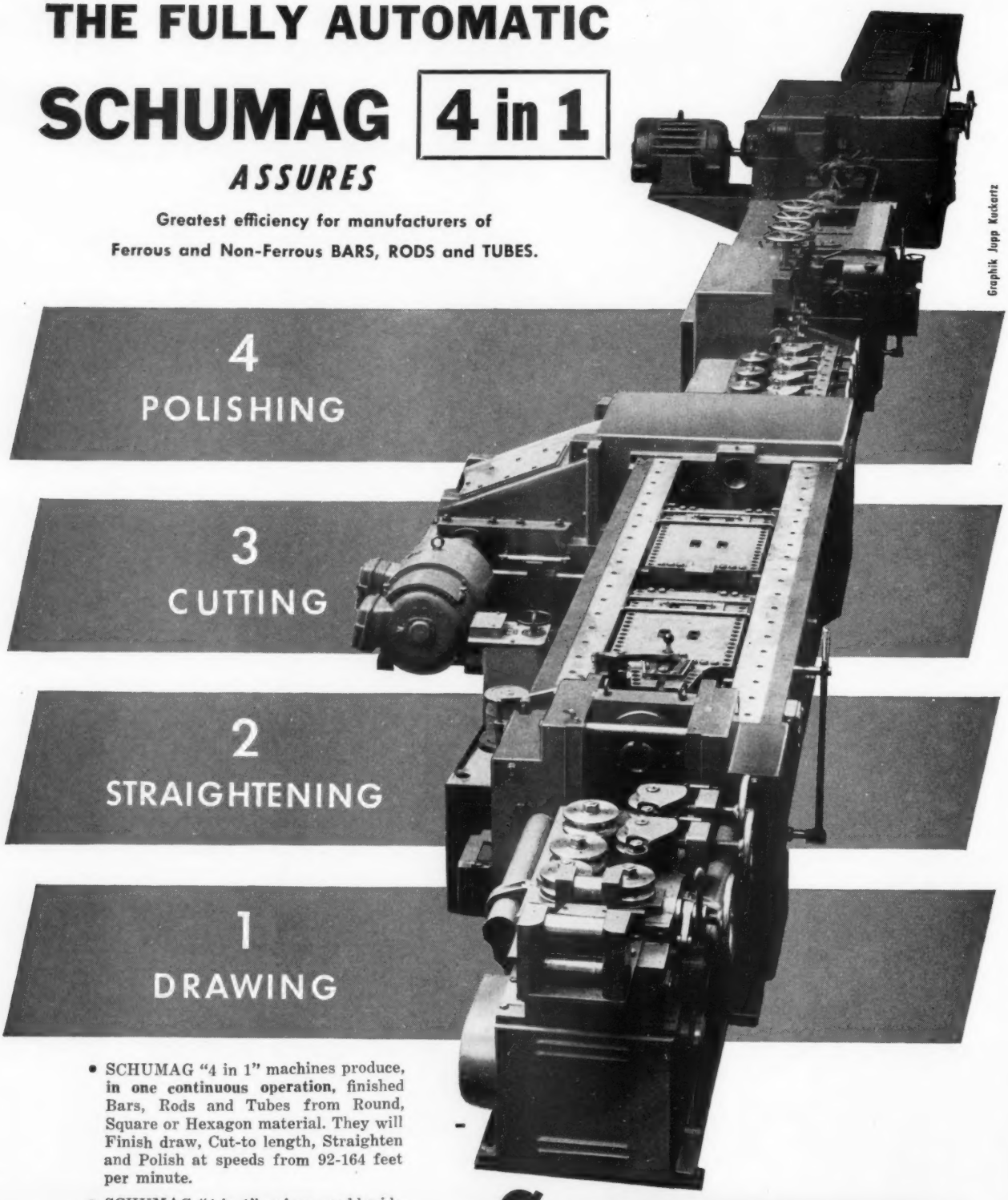
NEWARK 5, N. J. MILWAUKEE 2, WIS. U.S.A.

THE FULLY AUTOMATIC

SCHUMAG 4 in 1

ASSURES

Greatest efficiency for manufacturers of
Ferrous and Non-Ferrous BARS, RODS and TUBES.



Graphik Jupp Kuckartz

- SCHUMAG "4 in 1" machines produce, **in one continuous operation,** finished Bars, Rods and Tubes from Round, Square or Hexagon material. They will Finish draw, Cut-to length, Straighten and Polish at speeds from 92-164 feet per minute.
- SCHUMAG "4 in 1" enjoys world-wide reputation as the **ultimate** in technical development.

SCHUMAG
AACHEN

Exclusive Representatives for USA, Canada & Mexico
AMERICAN LAUBSCHER CORPORATION Fisk Bldg., 250 West 57th Street, New York 19, N. Y.

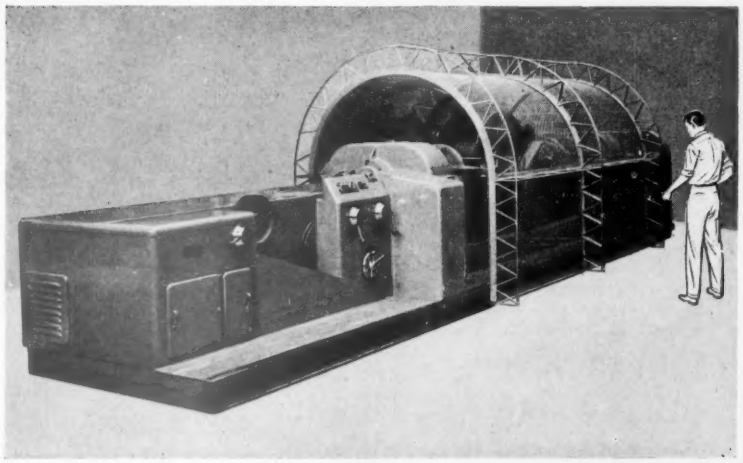
JEAN MAROQUÈNE

PAY LESS

for stranding insulated wires !

Godderidge offers you a new

FLYER-STRANDER which makes it possible



OUTSTANDING FEATURES :

OUTPUT SPEED : 300 ft/min. for all lays.

GREATER LENGTHS : due to 40 inch/take-up reel.

SYMMETRY STRANDING guaranteed by a spécial device.

Number of conductors up to 4; max. cablediameter: 0,8 inch

For further details write to :

Godderidge

11, avenue HENRI-BARBUSSE
HOUILLES (Seine-et-Oise)
FRANCE

the problem: ***how to produce* BUNCHED WIRE *with the smooth concentric qualities of stranded wire in a limited floor area?***

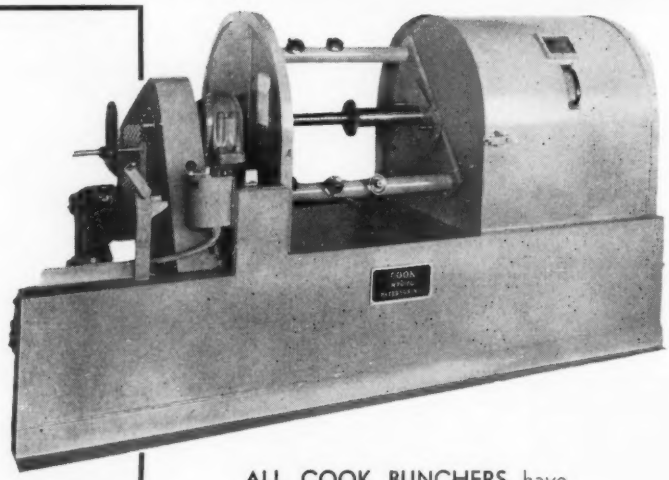
the solution: ***install a* COOK BUNCHER *with these features:***

HIGH SPEED

SINGLE TWIST FLYER

AUTOMATIC LAY CONTROL

LARGE TAKE-UP REEL



- *See Specification Chart below for the COOK BUNCHER most suited to your requirements.*

ALL COOK BUNCHERS have successfully formed bunched strands of 7, 10, 16, 19, 26, 41 and 65 wires with such concentricity as to enable its passage through an extruding die of only 1 mil clearance. In addition, such constructions as 27/36 and 41/36 have been bunched at high speed with perfect concentricity on these versatile machines.

- **CABLERS MODELS AVAILABLE IN SIZES UP TO AND INCLUDING REEL DIAMETERS OF 48 INCHES**

COOK MANUFACTURING COMPANY has a complete line of BUNCHING EQUIPMENT to accommodate the following reel sizes.

Model	Size	Capacity
B-H-8	8" x 6"	45 lbs.
B-H-12	12" x 8½"	90 lbs.
B-H-16	16" x 8½"	200 lbs.
B-H-21	21" x 8½"	350 lbs.
B-H-22	22" x 11"	500 lbs.
B-H-24	24" x 10½"	1000 lbs.

Capacity Based on Solid Copper Wire

- **Our Engineering Dept. is at your service to assist you in the solution of your wire problems—at no obligation of course.**

A Complete Line of Quality Machinery For The Wire and Cable Industry To Meet Rigid Specifications.

COOK MANUFACTURING CO.

50 EAST 25TH STREET, PATERSON, N. J. • ARMORY 4-6380

CANADIAN AGENT:
E. V. LARSON CO., LTD.
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CAPAMADJIAN LE MONNIER CIE LTD.
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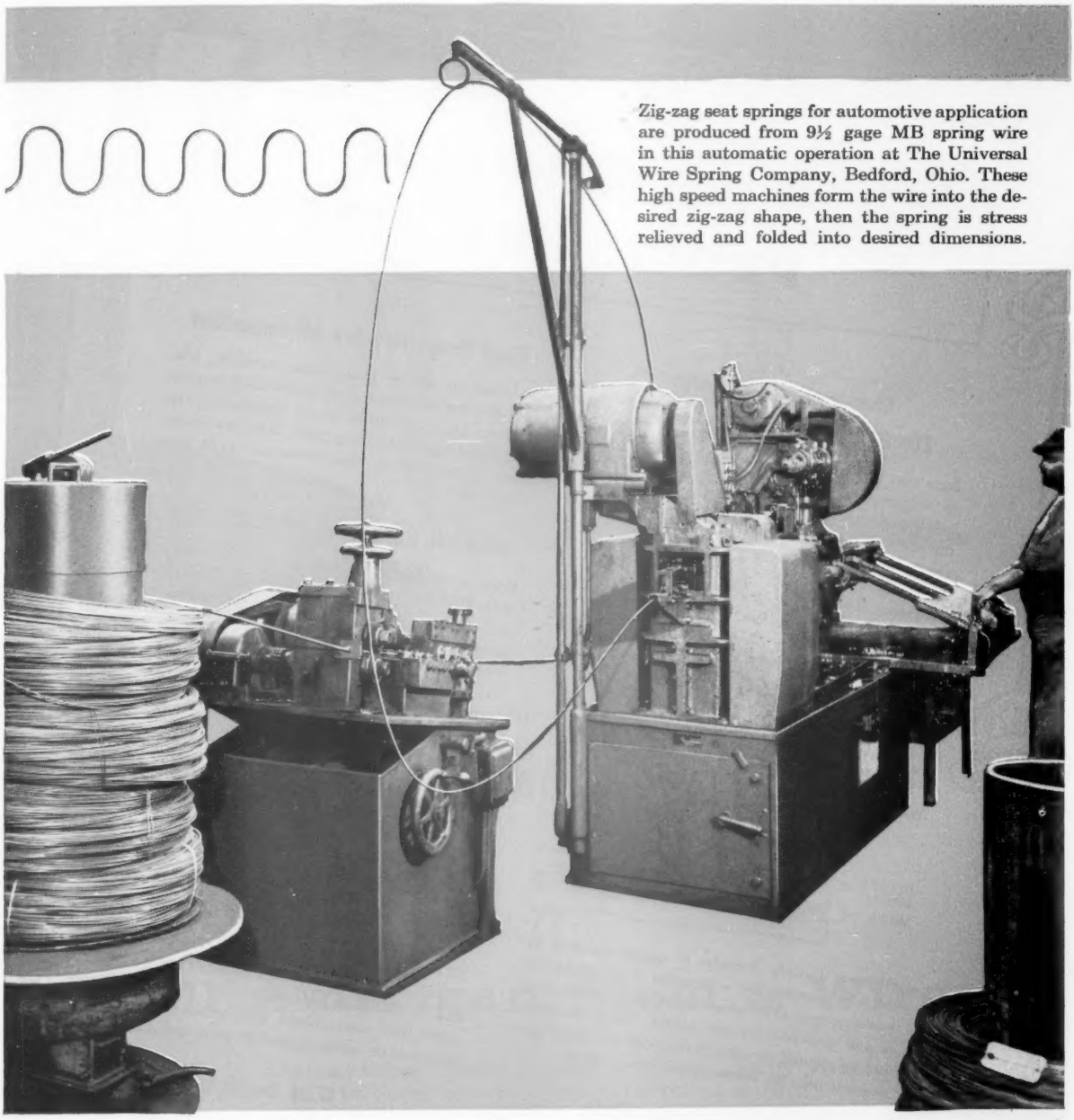


Zig-zag seat springs for automotive application are produced from 9½ gage MB spring wire in this automatic operation at The Universal Wire Spring Company, Bedford, Ohio. These high speed machines form the wire into the desired zig-zag shape, then the spring is stress relieved and folded into desired dimensions.

AUTOMATIC production requires AUTOMATIC quality of

J&L SPRING WIRE

Every coil of J&L spring wire is thoroughly tested for uniformity of physical and dimensional properties. This uniformity of J&L's famous Mastercraft, hard-drawn MB or Electromatic oil-tempered MB spring wire speeds production, reduces rejects, in automatic operations.

J&L exercises rigid quality control in every phase of production from ore mine to finished product. J&L wire is tops in quality . . . competitive in price.

Call your J&L representative the next time you order spring wire. Or write direct to the Jones & Laughlin Steel Corporation, Dept. 448, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

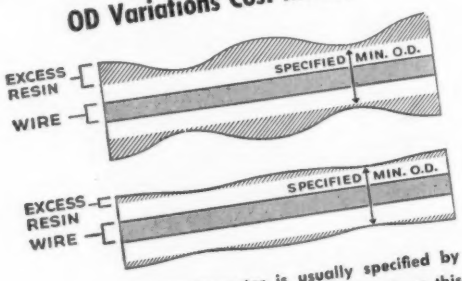
Jones & Laughlin STEEL
. . . a great name in steel

U.S.I. POLYETHYLENE PROCESSING TIPS

Choose the Right Resin For Polyethylene Wire Coating

Now that polyethylene is being widely accepted as an insulating material for wire and cable, insulated wire manufacturers and plastics producers are working closely together to provide the best insulations at the lowest possible cost. Although the only true test of a given polyethylene resin is a test run followed by a thorough evaluation of the finished wire, there are certain principles that can be used beforehand as guides. For example:

OD Variations Cost Money



Minimum Outside Diameter is usually specified by the wire customer. But a variation in OD above this minimum uses extra quantities of polyethylene resin — and cuts into extruder profits. These variations can be reduced by using resins with consistant flow characteristics as shown in the lower sketch.

Higher Production Rate Means Higher Profit

The faster a machine can be operated, the more money it can make. But higher rates require tighter controls – especially tighter control of resin properties. A resin variation that might still give a satisfactory product at moderate production rates may not be acceptable when the extruding rate is pushed to its limit. Again, consistency of resin properties is of extreme importance.

Final Properties Are All-Important

Deformation under load, stress-cracking, low-temperature brittleness and spark failure must be kept to a minimum in an acceptable wire and cable insulation. Any resin used, no matter what its processing characteristics, must pass these tests.

Why We Recommend PETROTHENE®

Because we make it – of course. But more than that, PETROTHENE does a good job for wire and cable extruders because our manufacturing process does achieve the high consistency processors are looking for. Shipment-to-shipment, bag-to-bag, and cube-to-cube, variations are held to a minimum. This high consistency enables insulated wire manufacturers to operate at highest rates with minimum OD variation when using PETROTHENE electrical grade polyethylene resins.

PETROTHENE resin properties also measure up to end-use standards for deformation under load, stress-crack resistance, low-temperature brittleness and spark failure.

Three Basic Resins Are Available

PETROTHENE 300, M.I. = 0.3; PETROTHENE 301, M.I. = 1.0; PETROTHENE 302, M.I. = 2.8. Each available with carbon black, color, JZF antioxidant, and/or non-discoloring antioxidant, compounded to your specifications.

U.S.I. Services

Literature and samples of PETROTHENE electrical grade polyethylene resins are available at your request. U.S.I. Technical Service representatives are also ready to help you with individual processing problems.

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers Products Corporation
99 Park Avenue, New York 16, N. Y.
Branches in principal cities

Chemical Progress Week — April 8-1[illegible]

Designing a new wire product?

Call American Steel & Wire!

Steel wire comes in so many different grades, shapes and finishes that it isn't easy to keep them all at your fingertips.

For this reason, we suggest that you give your American Steel & Wire representative a chance to help with new designs while they are still on the drawing board. He may be able to suggest 1) a more economical wire, 2) a wire that will fabricate more easily or 3) a slight design change that will simplify production or lower the cost of the raw material.

At AS&W, we *use* a lot of wire in our own plants; and have learned many little tricks that are yours for the asking. Just call your American Steel & Wire representative.

AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN MANUFACTURERS WIRE

USS TRADE MARK

AMERFINE—*high quality fine wire.*
AMERSPRING—*music steel spring wire.*
AMERTEMP—*heavy-duty oil-tempered wire.*
AMERLOY—*alloy heading wire.*
AMERHEAD—*uniform heading wire.*
AMERSTITCH—*extra-tough metal stitching wire.*

UNITED STATES STEEL

TWO-DAY PACIFIC COAST REGIONAL MEETING

to be Held in

SAN FRANCISCO, CALIFORNIA

THE TIME & PLACE: JUNE 13-14, 1957, AT THE FAIRMONT HOTEL

An ambitious and very worth-while program has been planned, this being the first time a two-day Regional Meeting has been arranged for the Pacific Coast. The names of the Program Committee members are given on page 436 of this issue.

THE PROGRAM

Thursday, June 13th

10:00 A.M. to 2:00 P.M. — Registration in Fairmont Hotel lobby.

2:00 - 3:30 P.M. — Panel discussion on material handling. See details below.

3:30 - 5:00 P.M. — Panel discussion on developments in wire machinery. See below.

Aerial view of section of Pittsburg, California, plant of Columbia-Geneva Division of U. S. Steel Corp. Wire Association members will tour the wire mill at this plant during the last day of their regional meeting in San Francisco in June.

THE PROGRAM

Friday, June 14th

9:00 - 10:00 A.M. — Registration.

10:00 A.M. — Busses leave for Columbia-Geneva plant visit at Pittsburg, Calif.

6:30 P.M. — Cocktail Hour.

7:30 P.M. — Dinner, followed by speaker and Bethlehem Steel movie.

Door prizes distributed.

PANEL DISCUSSIONS

The first panel discussion will be on the subject "HANDLING, PACKAGING AND SHIPPING OF WIRE PRODUCTS," covering: 1) Palletizing; 2) New developments in mill packaging; 3) Mill finishing (including applied protection, as oil, paper wrapping, etc.); and 4) Handling and storing. Lloyd D. Albright will serve as moderator.

The second panel discussion will have as a topic: "NEW DEVELOPMENTS IN WIRE MACHINERY," the discussion to cover: 1) Drawing machinery; 2) Straightening and cutting machines; 3) Spring making and wire forming machinery; 4) Heat treating equipment; and 5) Welding machinery. A. B. Kreidler is the moderator for this session.

PLANT TOUR

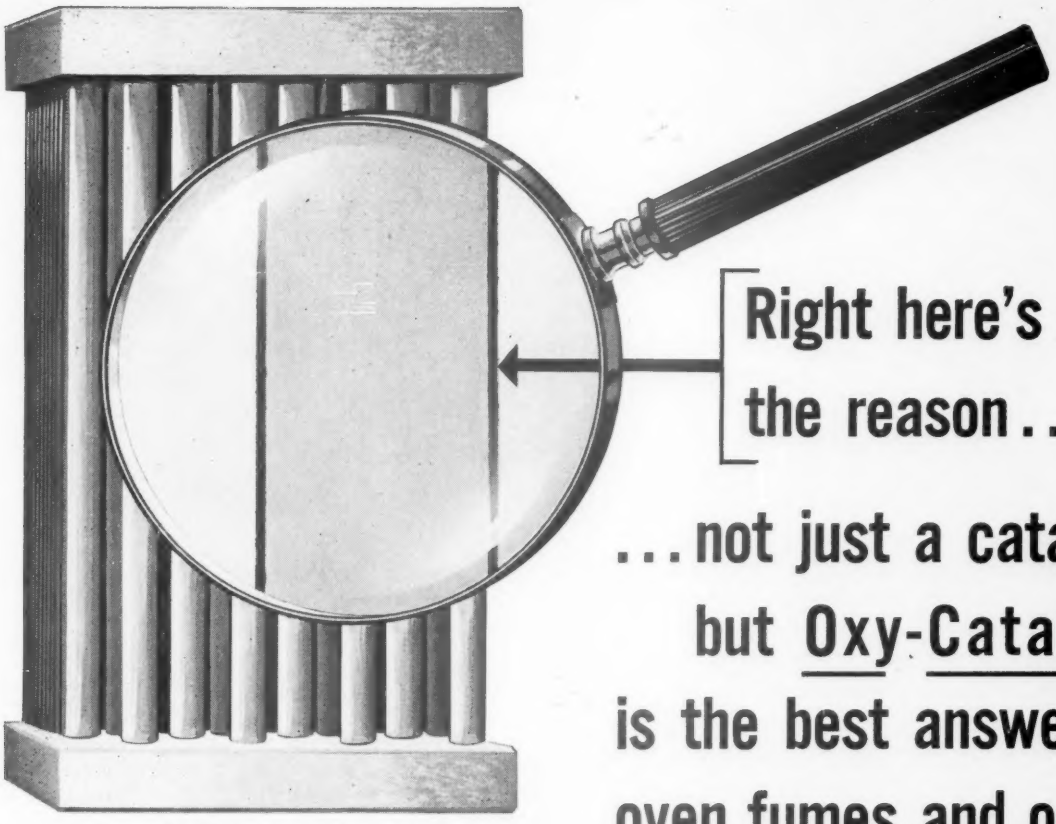
Upon arrival at the plant of the Columbia-Geneva Div. of U. S. Steel Corp. about noon, the group will be the guests of the company for luncheon. The tour of the wire mills should be completed by 4:00 P.M., when busses will return the guests to the Fairmont Hotel, where the activities of the evening will be held in the Terrace Room.

Persons planning to remain overnight are requested to make room reservations direct with the hotel.

THE WIRE ASSOCIATION

Richard E. Brown, *Executive Secretary*

453 MAIN STREET **STAMFORD, CONN.**



Enlarged cross-section drawing of an individual rod in an Oxycat unit

Right here's the reason...

...not just a catalyst but Oxy-Catalyst is the best answer to oven fumes and odors

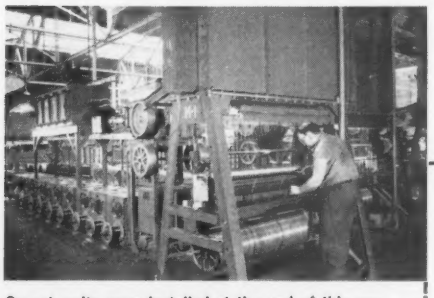
The secret lies in the .003-in. film on the porcelain Oxycat carriers. It's this more efficient catalyst which Oxy-Catalyst uses, a patented combination of alumina and platinum on porcelain, that gives better cleanup, better heat recovery, and longer catalyst life.

Oxycats can eliminate fumes and odors from drying ovens and other processes by oxidizing organic and combustible contaminants in the exhaust far more efficiently than any other catalyst ever developed.

To stop your oven fumes and odors—to recover waste heat—to reduce fire hazards and maintenance problems caused by troublesome condensates, Oxy-Catalyst offers a complete engineering service. We make the entire installation—engineered to your exact requirements—and we assume full responsibility for its performance.

Oxy-Catalyst works closely with all leading oven manufacturers. And new ovens can be designed with the catalyst as an integral part of the oven's heating system. So when you order new ovens, specify Oxy-Catalyst equipment.

If you would like to compare—to see for yourself the remarkably high efficiency of an Oxy-Catalyst installation—fill in this coupon, or write on your business letterhead, for complete information now.



Oxycat units were installed at the end of this vertical drying oven to oxidize troublesome solvent and varnish fumes at John A. Roebling's Sons Corporation, Electrical Wire Division Plant. This installation has been operating now for over 4 years.

OXYCAT

OXY-CATALYST, INC.

Industrial Division · Wayne, Pa., U.S.A.

Fume Elimination Processes and Equipment: Industrial • Automotive • Consumer Products

Oxy-Catalyst, Inc., Industrial Division, Wayne 12, Pa.

Please send me complete information on your catalytic installations:

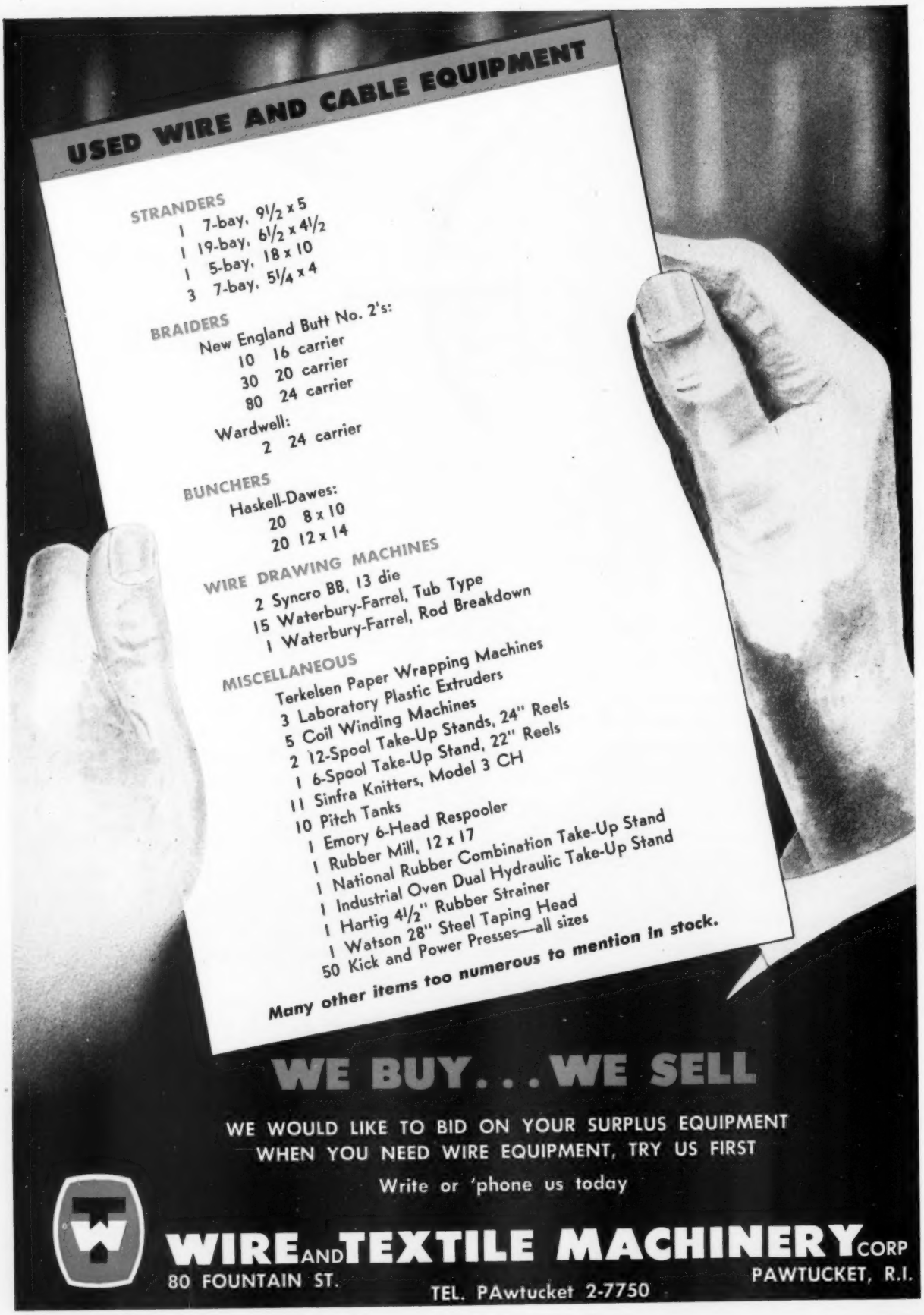
☐ For fume and odor elimination ☐ For waste heat recovery ☐ Have your representative call

Name_____

Firm Name_____

Street_____

City_____ Zone No._____ State_____


USED WIRE AND CABLE EQUIPMENT
STRANDERS
1 7-bay, 9½ x 5
1 19-bay, 6½ x 4½
1 5-bay, 18 x 10
3 7-bay, 5¼ x 4
BRAIDERS
New England Butt No. 2's:
10 16 carrier
30 20 carrier
80 24 carrier
Wardwell:
2 24 carrier
BUNCHERS
Haskell-Dawes:
20 8 x 10
20 12 x 14
WIRE DRAWING MACHINES
2 Syncro BB, 13 die
15 Waterbury-Farrel, Tub Type
1 Waterbury-Farrel, Rod Breakdown
MISCELLANEOUS
Terkelsen Paper Wrapping Machines
3 Laboratory Plastic Extruders
5 Coil Winding Machines
2 12-Spool Take-Up Stands, 24" Reels
1 6-Spool Take-Up Stand, 22" Reels
11 Sinfra Knitters, Model 3 CH
10 Pitch Tanks
1 Emory 6-Head Respooler
1 Rubber Mill, 12 x 17
1 National Rubber Combination Take-Up Stand
1 Industrial Oven Dual Hydraulic Take-Up Stand
1 Hartig 4½" Rubber Strainer
1 Watson 28" Steel Taping Head
50 Kick and Power Presses—all sizes
Many other items too numerous to mention in stock.
WE BUY... WE SELL
WE WOULD LIKE TO BID ON YOUR SURPLUS EQUIPMENT
WHEN YOU NEED WIRE EQUIPMENT, TRY US FIRST
Write or 'phone us today
WIRE AND TEXTILE MACHINERY CORP
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TEL. PAwtucket 2-7750

Unsurpassed-anywhere!

IT ALL COMES DOWN to one fact... that you can always count on Roebling high carbon flat spring steel to reduce preparation time, machine stoppages and rejects to a minimum. What's more, it's made as you want it... annealed, hard rolled untempered; scaleless tempered; tempered and polished, blued or strawed.

You *pay* for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING CF

Subsidiary of The Colorado Fuel and Iron Corporation

California giant Sequoias—largest of all trees.

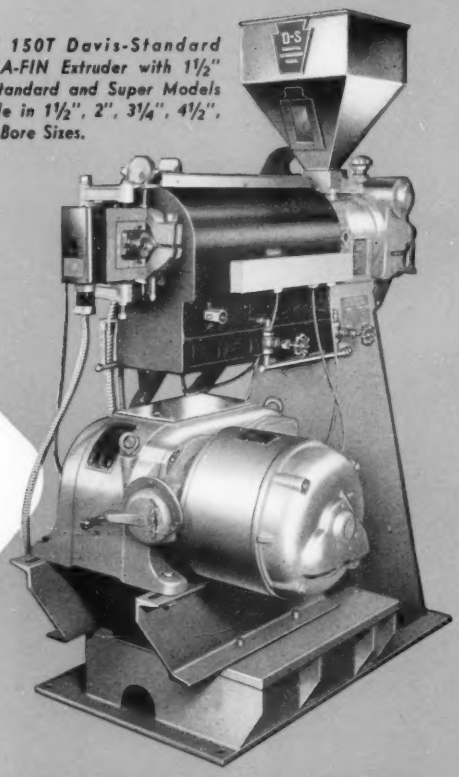
ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD., EVENDALE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 3001 DELMAR BLVD. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N.Y.

PHOTO BY MC MANUS

Meet The Smallest of The

THERMA-FIN EXTRUDERS*

Model 150T Davis-Standard THERMA-FIN Extruder with 1½" Bore. Standard and Super Models available in 1½", 2", 3¼", 4½", and 6" Bore Sizes.



This is Davis-Standard's Model 150T *THERMA-FIN* Extruder* with a bore size of 1½", the smallest bore size offered. A super model of the 150T, which features greater heating and cooling capacities, and a longer effective screw length than the standard 150T extruder, is also available.

One of the most unique features about the Model 150T is the excellent temperature control that is provided by Davis-Standard's exclusive *THERMA-FIN* Temperature Control System.

For Catalog Sheets or other additional information on THERMA-FIN Extruders, write to:

*U. S. Patent No. 2,774,107

SPECIFICATIONS

BORE SIZE: *1½ inches*

RATED CAPACITY (at 90 RPM screw speed):

Polyvinyl Chloride —	*Polyethylene* —
St'd. Model — *30 lbs./hr.*	St'd. Model — *25 lbs./hr.*
Super Model — *37 lbs./hr.*	Super Model — *30 lbs./hr.*

EFFECTIVE SCREW LENGTH:
St'd. Model — *27 inches.*
Super Model — *39⅜ inches.*

COOLING CAPACITY:
St'd. Model — *Total Heat Radiation Area of THERMA-FINS — 1800 Sq. In.*
Super Model — *Has Additional Area of 900 Sq. In.*

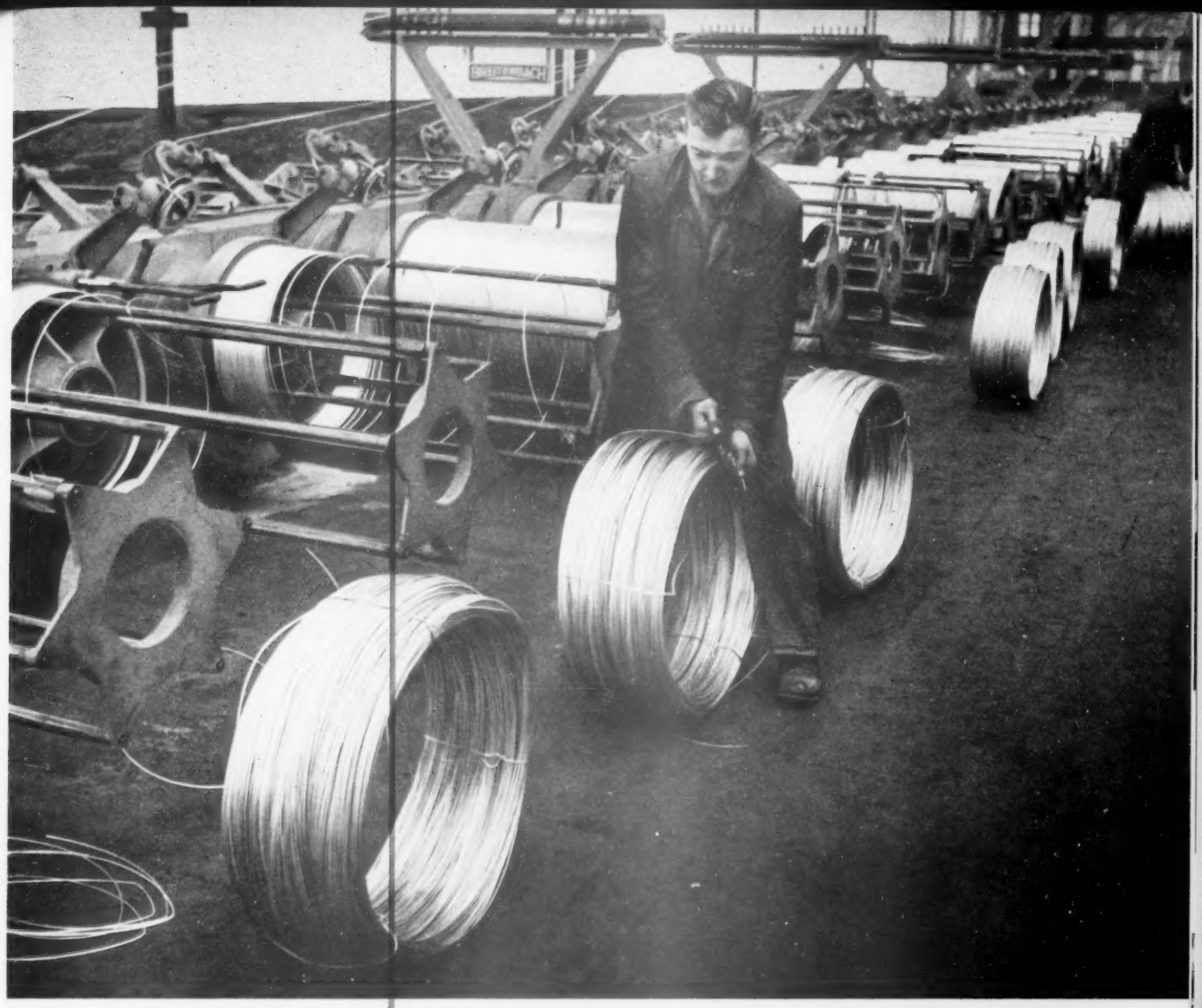
HEATING CAPACITY:
St'd. Model — *Head Zone 1000 W; Two Cylinder Zones 3000 W. each.*
Super Model — *Has 1 extra Cylinder Zone of 3000 W.*

DAVIS-STANDARD

Division of FRANKLIN RESEARCH CORPORATION

18 WATER STREET, MYSTIC, CONNECTICUT

IN EUROPE AND THE STERLING AREA, CONTACT FINNEY PRESSES LTD., BIRMINGHAM, ENGLAND



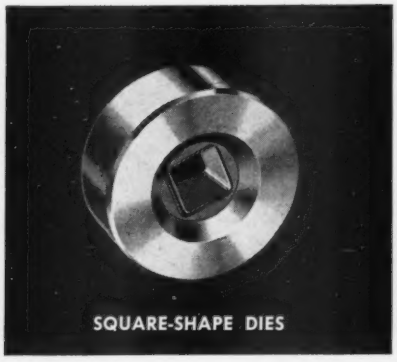
Take Up Frame for galvanised and patented wires
with stationary blocks or convertible to rotating action

WILHELM BREITENBACH
Maschinenfabrik
und Eisengießerei GmbH
UNNA / Westfalen
Western Germany

BREITENBACH · UNNA

THESE CARBOLOY® CARBIDE PRODUCTS,

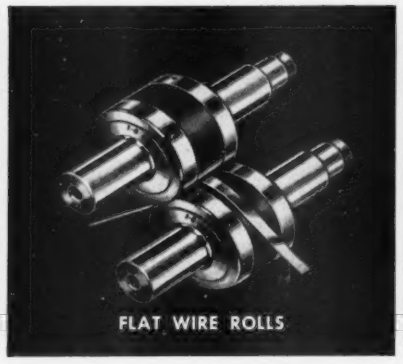
ROUND-HOLE DIES

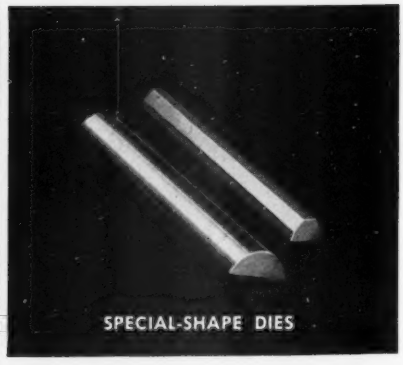

SQUARE-SHAPE DIES

HEX-SHAPE DIES

PLUS "BONUS" CARBOLOY® SERVICES,

EXTRUSION DIES


FLAT WIRE ROLLS


SPECIAL-SHAPE DIES

WILL HELP YOU IMPROVE QUALITY...

MANDRELS

HEADER DIE NIBS

BUSHINGS AND RINGS

AND REDUCE YOUR PRODUCT'S COST

Whether your business is drawing, flattening, extruding, or heading, there's a Carboloy product to fit your needs. And, Carboloy "bonus" services — engineering aid, local delivery, servicing facilities — will help you get maximum production from your equipment. For information, or a copy of the Carboloy Die Catalog, write: *Metallurgical Products Department of General Electric Company, 11171 E. 8 Mile Street, Detroit 32, Michigan.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

"In our business there is no substitute for BRASS"

says HAROLD H. PORTER
of The Star Pin Co., Shelton, Conn.

Mr. Porter explains why Brass is preferred for Common Pins

"Brass is and for a century has been preferred for common pins," states Harold H. Porter, of The Star Pin Co.

Unlike hard-to-plate pins of ordinary steel, brass pins resist corrosion. They are safer to use since they won't stain textiles, garments or papers with rust. From the manufacturer's standpoint, too, brass wire is more desirable to work with than stainless steel.

Good pins can be made only when the wire supplied is of accurate roundness, gauge and temper which is a controlling reason why "Chase" has been a valued supplier of Brass Wire during much of The Star Pin Company's ninety years in business.

Why don't *you* try Chase on your next order for brass wire? A nearby Chase warehouse is ready to serve you!

PIN POINTERS

ORDINARY STEEL	*difficult* to plate; tends to *corrode*
STAINLESS STEEL	*dull* finish; *hard* on tools
CHASE BRASS	*easy* to plate; *easy* to fabricate; *bright* appearance; *resists* corrosion

Chase

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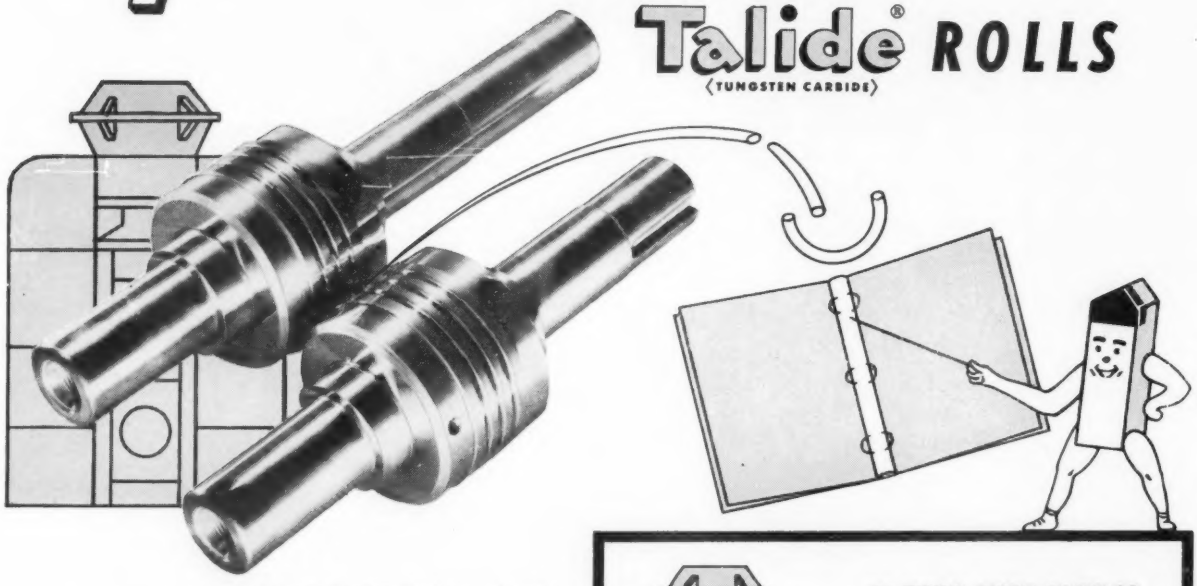
7 years' continuous service with Talide® ROLLS
(TUNGSTEN CARBIDE)



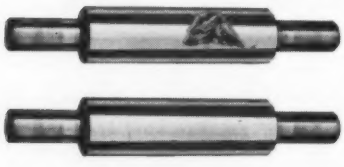
● A large Eastern Producer of oval-shape wire for loose-leaf notebook rings was experiencing excessive wear and pick-up. The high scrap rate was making the item unprofitable. Metal Carbides service engineers were called in to determine if Talide rolls could correct the trouble. Hi-carbon wire was being reduced on a 2-hi cold rolling mill to an oval shape .100" thick x .156" wide. Considerable stress and pressure was required to deform the wire to proper shape.

Our engineers designed a roll incorporating a carbide sleeve having 3 grooves ground in periphery and mounted to a special alloy steel arbor. The initial pair of rolls was installed in 1948 and has been in continuous service ever since. Due to their extreme hardness it has not been necessary to remove them from the mill during this 7-year period—not even for a regrind! Size and shape of wire has been perfectly maintained. Customer has since installed similar rolls on all their mills.

SUPERSET GRINDING WHEEL

The Superset diamond grinding wheel was specially developed for grinding carbide rolls to highest possible surface finish and luster. Made of 4-8 micron size diamond dust, it imparts a surface finish far superior to any other commercial wheel. Available in sizes up to 25" diameter.

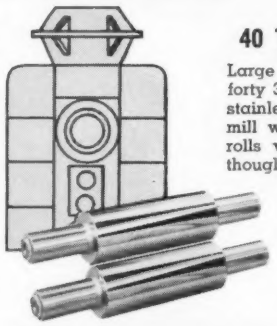
EXCLUSIVE REPAIR SERVICE



Broken or damaged carbide rolls can be re-worked to first class condition with all defects eliminated at one-half original cost. Only Metal Carbides offers this service—because of its exclusive hot press method.

Metal Carbides Corporation,
Youngstown 12, Ohio.

Send for new 84-page catalog 56-G

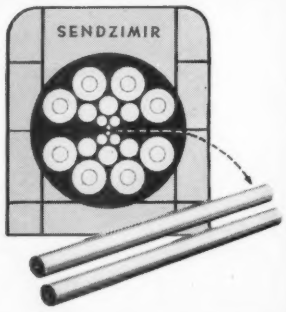


40 TIMES MORE TONNAGE

Large Steel Producer cold rolls forty 3,000 lb. coils (60 tons) of 18-8 stainless steel, series 300, on 4-hi mill with one pair of solid Talide rolls with no surface wear, even though strip work hardens to 50 Rockwell "C" in one pass. Flatter, smoother strip produced—even when rolling intermittent widths. 40 pairs of steel rolls were required previously to produce same tonnage.

ROLL LIFE INCREASED 278 to 1!

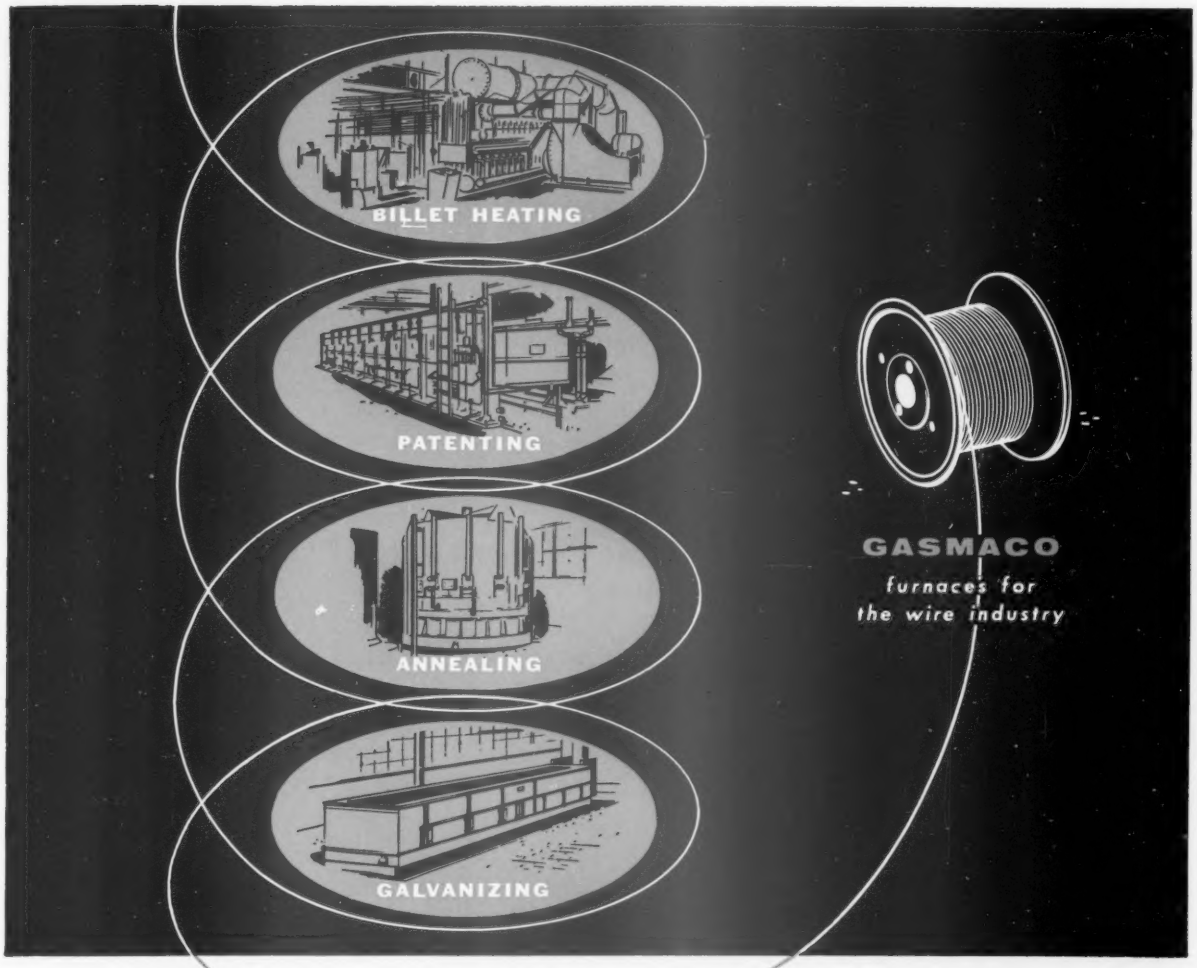
All users of Sendzimir rolling mills have adopted Talide work rolls because operating results have been phenomenal, far surpassing all expectations. Tremendous production runs are commonplace with mill after mill reporting increased tonnage runs between roll changes of 278-1, 179-1, 82-1, etc.



Talide Rolls are made in lengths up to 100", diameters up to 25", and up to 5000 pounds by weight.

METAL CARBIDES CORPORATION
TALIDE®
YOUNGSTOWN 12, OHIO

HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • CERMETS • HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY



WIRE MILL FURNACES

In the world of wire, the following GASMACO Furnaces are speeding production and improving quality . . .

BILLET HEATING—GASMACO reverse flueing . . . recuperative . . . designed to eliminate mill delay problems . . . single zone and double zone . . . up to 100 tons/hr.

PATENTING—GASMACO patented* silicon carbide radiant tubes permit high temperature operation with atmosphere . . . also direct-fired . . . either type supplied complete with lead quench or acid bath . . . up to 8000 lbs./hr.

ANNEALING—GASMACO single stack, direct-fired design . . . for rod or wire . . . alloy inner cover . . . tangentially fired . . . special pedestals.

GALVANIZING—GASMACO special design . . . fired along sides of tank . . . no flame impingement . . . reduces drossing.

THE GAS MACHINERY COMPANY, INDUSTRIAL FURNACE DIVISION
16110 Waterloo Road, Cleveland 10, Ohio
In Canada: The Gas Machinery Co. (Canada) Ltd., Hamilton, Ont.

*Send for Bulletin A-106 GASMACO SILICON CARBIDE RADIANT TUBE FURNACE IMPROVES WIRE PATENTING OPERATION.

Check first with GASMACO for latest industrial furnace designs.

THE gas machinery COMPANY

GAS PLANT EQUIPMENT
AND INDUSTRIAL FURNACES

Be Sure to Attend...

THE CANADIAN REGIONAL MEETING

Monday and Tuesday, May 13-14, 1957

Royal Connaught Hotel, Hamilton, Ont.

A WELL-BALANCED PROGRAM OF EXCELLENT TECHNICAL PAPERS AND EVENTS WILL MAKE THIS MEETING ONE THAT EVERY WIRE MAN CAN ATTEND WITH PROFIT AND ENJOYMENT.

THE PAPERS

"ROD PACKAGING" by J. S. Laver, Manager of Production Scheduling, Steel Company of Canada Ltd., Hamilton.

"SOME ASPECTS OF QUALITY CONTROL" by G. Globe, B. Greening Wire Co. Ltd., Hamilton.

"THE VALUE OF RIMMED, CAPPED AND KILLED STEELS FOR WIRE RODS" by Ralph Hindson, Asst. Chief Metallurgist, Steel Company of Canada Ltd., Hamilton.

"STAINLESS STEEL SPRING WIRE" by J. Trent, Cold Drawing Dept., Atlas Steels Ltd., Welland.

"ALUMINUM MAGNET WIRE" by J. G. Moher, Process Engineer, Canadian General Electric Co. Ltd., Peterborough.

"METALS IN COMMUNICATION AND POWER TRANSMISSION" by Dan Boyd, Metallurgical Dept., Northern Electric Co. Ltd., Lachine, Que.

"SUPERSONIC MEASUREMENT OF LEAD SHEATHING ON CABLES" by Mr. Ruskin, Phillips Electrical Co. (1953) Ltd., Brockville.

THE PROGRAM
Monday, May 13th

9:00 A.M. Registration

10:00 A.M. Directors' Meeting

12:30 P.M. Directors' Luncheon for Program Participants

2:30 P.M. Technical Session

6:30 P.M. Hospitality Hour

7:00 P.M. Dinner, Ladies invited

THE COST

One charge will cover all events. $12.00 for Association members and $13.00 for non-members.

Aerial view of the City of Hamilton, where The Wire Association will meet.

THE PROGRAM
Tuesday, May 14th

9:30 A.M. Visit to Parkdale Works, Steel Company of Canada, Hamilton

1:30 P.M. Visit to Federal Wire & Cable Co., Guelph

or a

visit to B. Greening Wire Company's Wire Mills in Hamilton, as preferred

THE LADIES

A special program is being planned for the ladies. This will include a tour on Tuesday.

Association members are being sent a reservation card for hotel accommodations. Others who wish to attend may write or phone for such a card.

All wire men are invited to attend this meeting.

THE WIRE ASSOCIATION

RICHARD E. BROWN, Executive Secretary

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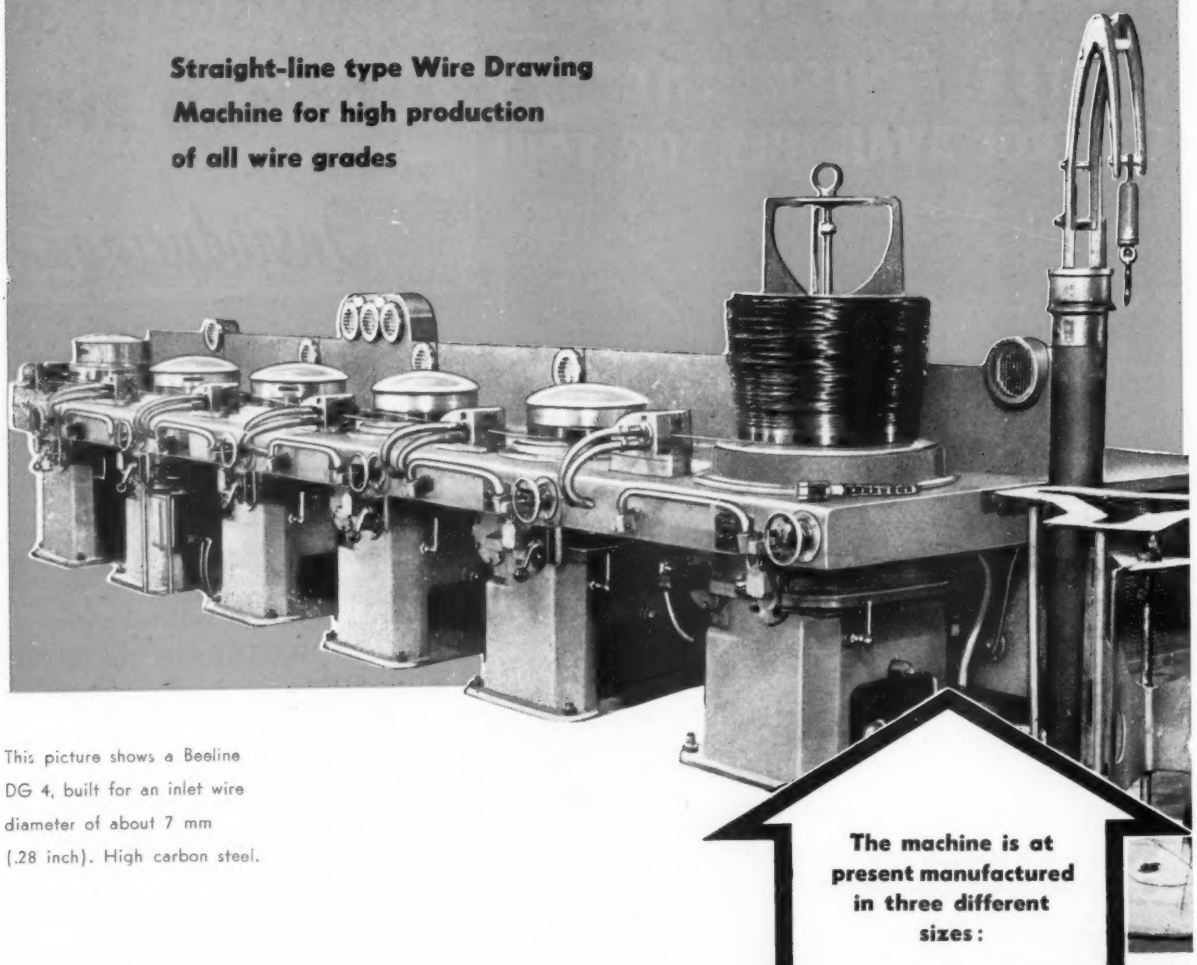
Straight-line type Wire Drawing Machine for high production of all wire grades



This picture shows a Beeline DG 4, built for an inlet wire diameter of about 7 mm (.28 inch). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5

for heavy wire, about 13 mm. (.500 inch)

BEELINE DG 4

for wire rods, about 7 mm. (.28 inch)

BEELINE DM 3

for wire with an inlet diawire of about 3 mm. (.116 inch)

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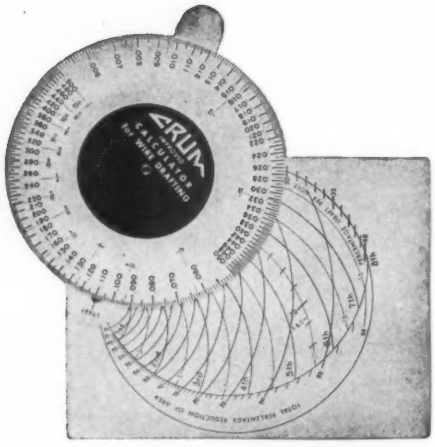
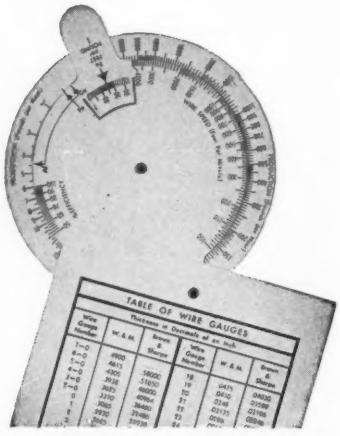
Useful and Accurate!



Front view of Crum Calculator.

THIS NEW DOUBLE-PURPOSE CALCULATOR WILL:

1. Provide quicker and more accurate information on die sizes and reduction areas;
2. Calculate wire production rates for various speeds and efficiencies.



Reverse view of Crum Calculator.

SOME OTHER FEATURES OF THE CALCULATOR

- Has new scale for more accurate determination of small percentages.
- Gives readings in B & S gauges.
- Intermediate lines provide reductions for 16 holes in one setting.
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- Still fits your vest pocket.
- Handy tables of W & M and B & S gauges.
- Feet per pound calculating scale for steel, copper and aluminum wires.
- Durable, accurate, easy to use.

The improved Crum Calculator is worth its weight in gold in time saving —no laborious mathematical calculations necessary when you use it. Instruction sheet with examples accompany each Calculator. You should have one or more in your wire drawing department.

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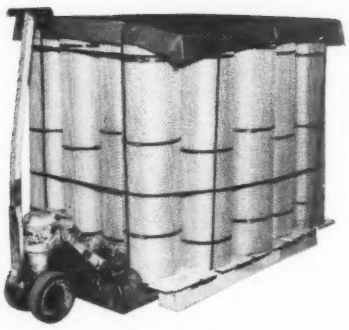

How **REYNOLDS** packs new savings into wire cloth shipments

• Palletized packaging for wire cloth, successfully developed by the Reynolds Wire Division of National-Standard, is now saving customers plenty of time and dollars.

Note in the photographs how rolls of slit and full width material are both mounted on non-returnable pallets. Advantages and savings accrue all along the way.

For example, there's far less chance of damage in shipment. And think how much faster, easier, these unit loads can be handled on arrival . . . in and out of storage . . . and right to production operations.

So chalk up another extra for Reynolds' service . . . and find out what this new packaging method can mean to you! Find out, too, what Reynolds means by quality control and uniformity in wire cloth manufacture. It pays.

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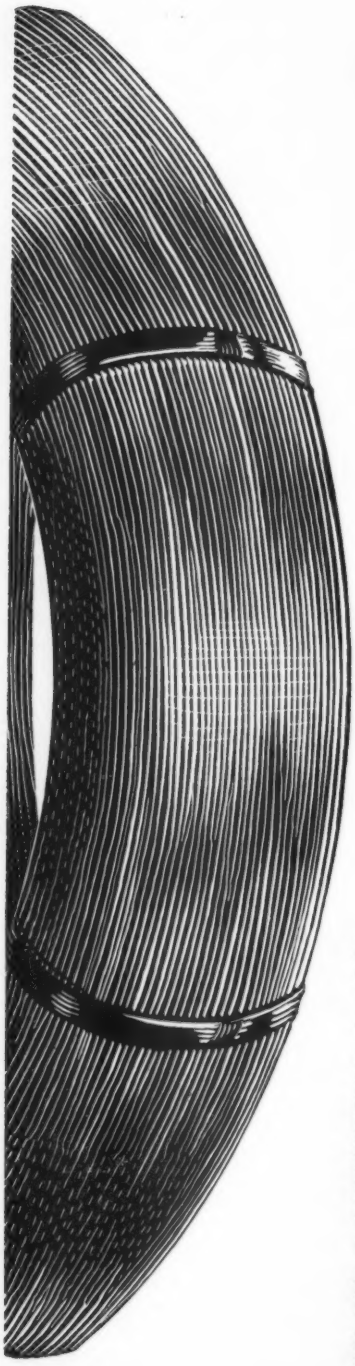
DIVISIONS: NATIONAL-STANDARD, Niles, Mich.; *tire wire, stainless, music spring and plated wires* • WORCESTER WIRE WORKS, Worcester, Mass.; *high and low carbon specialty wires*
WAGNER LITHO MACHINERY, Secaucus, N. J.; *metal decorating equipment* • ATHENIA STEEL, Clifton, N. J.; *flat, high carbon spring steels* • REYNOLDS WIRE, Dixon, Ill.; *industrial wire cloth*



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No matter what type wire you require, Youngstown should be your specification for high quality, uniformity and dependability. That's because they are **all** drawn from specially refined open-hearth carbon steels to meet **your** most exacting specifications.

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Why not study this listing—it may suggest new products you could make from Youngstown Wire to boost both your sales volume and profits.

For additional information or metallurgical assistance, write or phone today to your nearest Youngstown District Sales Office.

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Bicycle Spoke Wire
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Bolt and Rivet Wire
Bond Wire
Bonnet Wire
Bookbinder Wire
Border Wire
Bottle Handle Wire
Bottling Wire
Box Binding Wire
Box Hinge Wire
Brace Wire
Brick Cutting Wire
Bright Wire
Broom Wire
Brush Wire
Buckle Wire
Bundling Wire
Button Hook Wire
Cable Armor Wire
Can Key Wire
Cap Screw Wire
Car Heater Wire
Car Seat Wire
Card Wire
Cast Steel Wire
Ceiling Hook Wire
Chain Welding Wire
Chain Wire
Chair Rods
Chair Wire
Channel Bead Wire
Channel Pin Wire
Check Rower Wire
Clasp Wire
Clip Wire
Clothes Line Wire
Clothes Pin Wire
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Coat and Hat Hook Wire
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Coppered Wire
Core Wire (A.C.S.R.)
Cork Screw Wire
Cotter Pin Wire
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Damper Rods
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Dowel Wire
Duck Bill Nail Wire
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Edge Wire
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Flesh Fork Wire
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Saddle Spring Wire
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Scratch Brush Wire
Screen Wire
Screw Wire
Screw Driver Wire
Screw Rod Wire
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Shelf Wire
Skid Chain Wire
Smooth Wire
Snare Wire
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Spark Plug Wire
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Spoke Wire
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Stapling Wire
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Stone Wire
Stove Bolt Wire
Stove Pipe Wire
Stove Rods
Straightened & Cut Wire
Strapping Wire
Stud Stock
Surveyors' Chain Wire
Tack Wire
Tag Wire
Tie Wire
Tire Bead Wire
Towel Rods
Toy Wire
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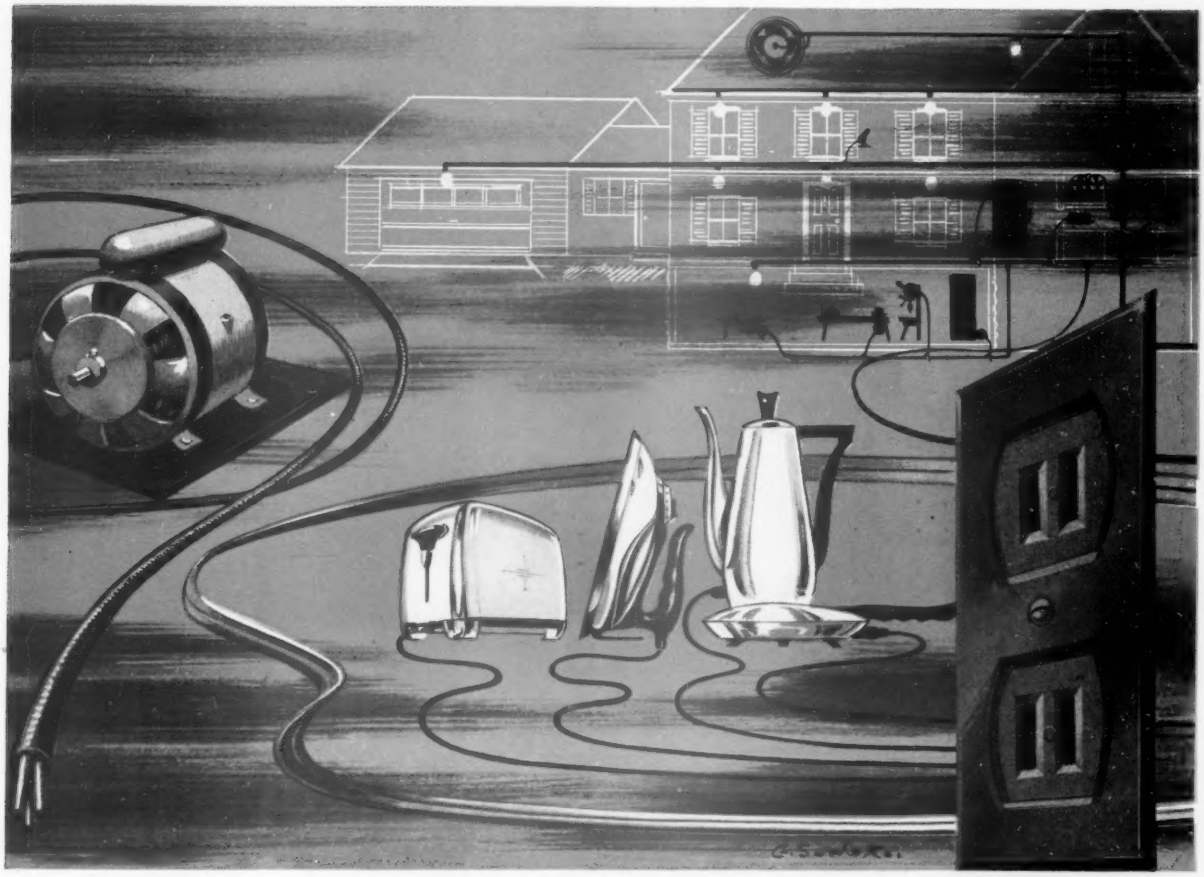

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Two of these Marvinol® resins, VR-22 and VR-23, have already received UL approval. These resins are, respectively, of high and intermediate molecular weight. Both have good dry blending properties.

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The New V-R Die Catalog gives complete ordering information on all V-R Dies for drawing wire, rod, bar and tube.

Vascoloy-Ramet CORPORATION

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The Wire Outlook

The ever-burning question is whether business will continue to hold up. A degree of uncertainty is reflected in many business indicators.

Purchasing agents are showing caution and resistance to higher prices. Inventories are low, particularly on nonferrous metals, and will be kept so while the uncertainty lasts. Appliance manufacturers are cutting production to bring inventories in line with demand, and new residential construction is continuing its downward trend. There is some evidence that steps will be taken to loosen credit to reverse the trend, at least on home building. Unemployment is likely to increase.

Offsetting this, consumer spending is holding at good levels, business spending for plant and equipment is at a record high, and government spending—federal, state and local—is increasing.

The boom appears to be losing some of its force. It is now apparent that further increases in prices are likely to affect sales and that net earnings will not be increased by the device of upping prices to offset added rises in costs. It is a good time for labor to reflect upon the effect of further wage and benefit demands, for money, broadly speaking, is to be kept tight. Some of the price declines in many commodities are the result of greater supply in the face of lessened demand.

The recent gyrations of the stock market are no cause for alarm. Prices were too high and with profits squeezed, the boom checked and competition keener, the declines are in the nature of technical corrections. Observers feel that stock prices are now more likely to go down than up during the remainder of the year.

Tax relief will have to wait upon cuts in government spending. Much pressure is being put upon our Congressional representatives to reduce federal spending. While there has been much talk, there is no evidence so far that expenditures will be curtailed substantially. Yet it could and should be done. Government spending is budgeted for 85 billions in 1957, against 79.8 billions in 1956. Pressure on Congress is mounting all the time.

One reason why money will be kept tight is that the private debt of the country is considered to be too high. It now stands at 425 billions, an increase of 285 billions in the last 10 years. Individual debts, a part of the total, amount to 136 billions. This represents installment buying, which includes mortgages on homes.

Consumer outlays for goods and services are running at the rate of 279 bilions for this year, contrasting with 265.7 billions for last. Business is estimated to be going to spend around 71 billions in 1957. Last year it spent 66.8 billions. While the rate now is at the 71 billion point, there is some question as to whether this will hold for the balance of 1957.

Some added demand is injecting a little life into the merchant wire market, but the gains are not spectacular. Jobbers for the rural markets are buying cautiously. Manufacturers' wire is flowing steadily to buyers, although most mills have plenty of capacity for larger orders. Automotive buying remains spotty. Makers of springs, screws and cold headed products are placing only small orders, still working on inventories on hand for much of their needs. Wire rods are slow, the supply well in excess of demand. Most of the price increases have been on extras.

While plant expansion is necessary as a long-range measure, the emphasis this year will be on cost cutting. Any machine manufacturer who can offer equipment that will reduce the cost of production should have little difficulty in selling his wares.

Despite the desire of the Administration to be conservative with the people's money, there is too much fiscal looseness in Washington, too much of the easy-come, easy-go New Deal attitude on the part of our representatives.

Prosperity is largely a matter of psychology. Tampering with the laws of supply and demand has its effect, certainly; but as long as the public and business maintain their confidence in the future, there is little likelihood that a major reaction will develop to break the long run of post-war good business.

Edmund Duval Sickels

EDITOR

STEELSKIN Lubricants
—and how to use them...

This is the first in a series of advertisements cataloging the complete line of Steelskin Lubricants. Keep this for handy reference.

No. 1 of a series

PRODUCT	SHIPPING INFORMATION	USES
CXH POWDER	300# Net FIBER DRUM	For drawing rod and wire (coated with lime or STEELSKIN W-Coating) for springs, nails, galvanizing, tire bead, rope, poultry netting, screen cloth, etc.
REDSKIN CRYSTALS	400# Net FIBER DRUM	For the economical production of an adherent and uniform copper-coating on both high- and low-carbon wire without the use of an electric current.
W-BRIGHT GREASE	440# Net STEEL DRUM	A one-hole grease for producing extra-clean, extra-bright finishes using a light-lime coating.
#5 POWDER	230# Net FIBER DRUM	A general-purpose, dry-drawing lubricant for limed wire and rod, both high- and low-carbon. The finished coating is more readily removed.
JD PASTE COMPOUND	440# Net STEEL DRUM	An emulsion-type lubricant for wet-drawing steel—liquor-finished or galvanized, copper, bronze, brass, and other alloys.
SS POWDER	300# Net FIBER DRUM	Specially developed for drawing stainless steel.
GF POWDER	260# Net FIBER DRUM	A recent development for drawing heavily-limed wire going to ultra-high-speed nail machines.
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WIRE
AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 32 April, 1957 No. 4

Bolt Making—Mass Production Of A Precision Product

by John S. Davey, Vice President
Russell, Burdsall & Ward Bolt and Nut Company
Port Chester, New York

While bolts are among the most commonly used products made from wire, they are also among the most precisely made. There are at least a dozen dimensions that bolt manufacturers must observe on every standard bolt. Tolerances are clearly defined in standard specifications used by metal fabricators and they must be adhered to closely if the product is to gain acceptance.

★ ★ ★

Despite the precision requirements, bolts are mass produced at low cost. The development of efficient techniques in this industry shows how precision and skill can be applied to the making of these low-cost wire products.

★ ★ ★

In fact, plants for producing bolts already use many of the techniques of automation:

—Dissimilar operations have been combined in one machine to eliminate handling of materials between processing steps.

—Positioning of parts has been mechanized. Machines into which wire rod is fed automatically and continuously perform several precision operations in sequence without the constant attention of the operator.

A description of the sequence of operations by which wire rod is transformed into fasteners for industrial uses.

—A bolt making machine operator's principal job is to set up and adjust the machine and to check the product for accuracy. He is not engaged in a machine operator's traditional occupation of moving and positioning materials. His job requires more knowledge of machine and product than manual work.

★ ★ ★

While the processes by which wire rod is made into bolts are simple when considered as separate operations, combining them into mass production techniques requires a high degree of skill. Uniform quality, which makes mass production of bolts efficient, depends upon the engineering talents of the bolt manufacturer and the experience of his workmen in every step of production.

The Raw Material

Wire rods from which the bolts originate are hot rolled to size at the steel mill. At the bolt making plant, they are unloaded, inspected and piled in storage according to steel analysis until required for use. More than 15 different analyses are stocked in order to be able to supply the demand for the numerous specifications required by product fabricators.

★ ★ ★

When they come from the steel mill, rods are coated with an oxide scale that must be removed before they are drawn into wire for bolts.

Cleaning

Cleaning is accomplished by immersing the rods in a tank or bath of heated dilute sulphuric acid, followed by several rinses, and by dipping in a lime solution which acts as a lubricant carrier for the drawing operation. After cleaning, the coils are welded together end to end in a butt welder to form one continuous coil so that bolt making machines can operate continuously.

Drawing

To size the wire exactly, it is drawn through a series of tungsten carbide dies. A coating compound is carried in the die box and the etched clean surface picks up some of the compound and

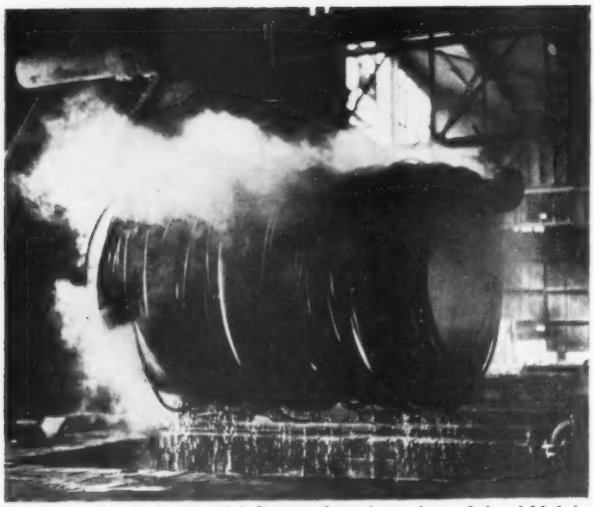

Fig. 1—In the first step of bolt manufacturing wire rod is pickled in dilute acid bath and coated with lime before drawing. * * * *

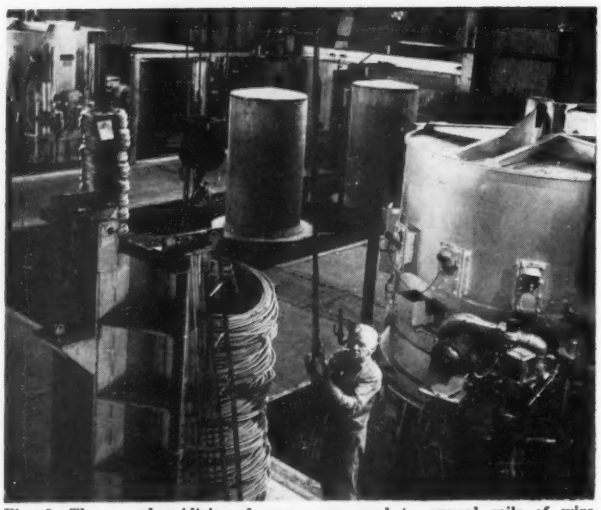

Fig. 2—These aspheroidizing furnaces are used to anneal coils of wire rod to change its physical structure before heading. * * * *

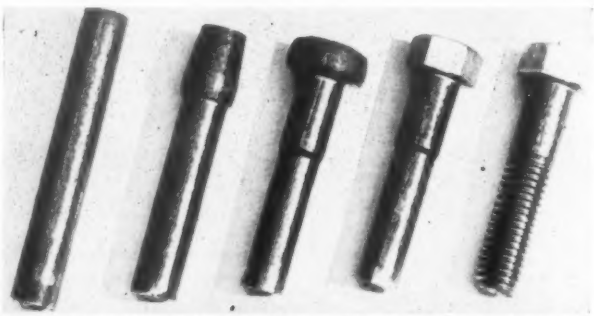

Fig. 3—Wire is fed into a bolt-making machine that performs six or more operations to produce a bolt to dimensions that permit complete interchangeability in thousands of industrial applications. * * * *

carries it through the die, reducing the diameter and giving a good finish to the wire.

Heading

For the next step, the rod or wire arrives at the heading machines—generally called headers. In these machines a piece of wire is cut off to the required length and fed into the hole in the heading die. The first blow, bulbing, drives the piece down into the hole in the die until it comes up against a stop and "upsets" the end of the wire in the form of a bulb. The bulbing punch then moves out of the way and the heading or finishing punch moves in to complete the upsetting. It forms the head on the bolt blank. The blank is next kicked or pushed out of the die and falls down into a chute leading to the next operation.

* * *

Rivet headers are designed to upset or form a head in only one blow. Belt machines are designed to use two or three blows, depending on the amount of metal necessary to form the head and the final shape of the required head.

* * *

The heading operation is one of the most important in the manufacture of the bolt. Here are some

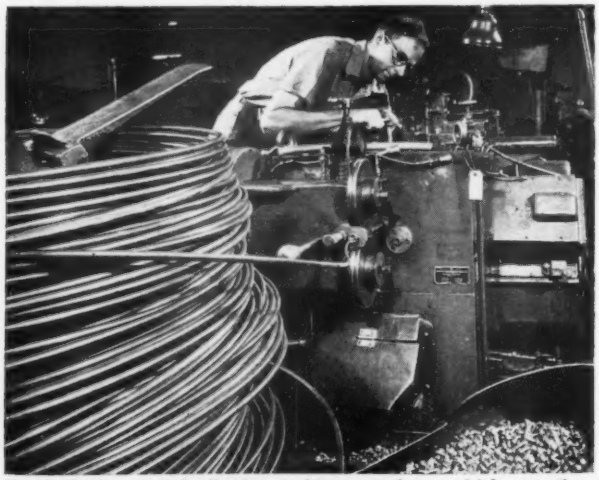

Fig. 4—Setting up and adjusting machine to perform multiple operations of bolt making requires a high degree of precision skill. * * * *

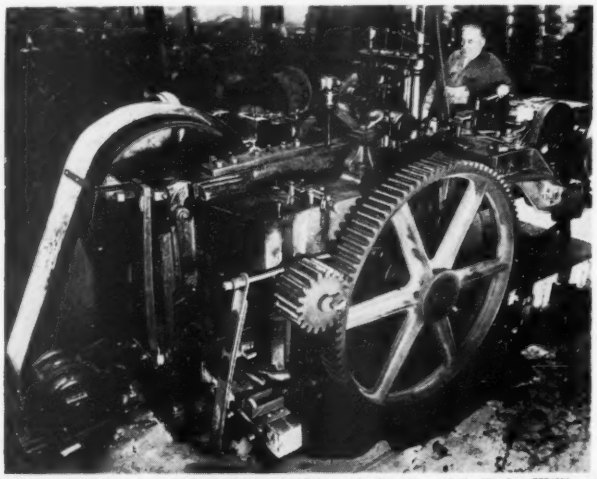

Fig. 5—World's first bolt-making machine, designed and built by William E. Ward, is still in operating condition. * * * * * * *

of the requirements that must be watched:

(a) The wire must be well cleaned, properly coated and tempered, and exact in size.

(b) The cold upsetting work must be properly divided between the punches involved. Too much work done by either punch can throw the work off center.

(c) Having a bulbing punch of the correct shape to do the job is also very important. This punch must start the metal flowing correctly.

(d) A good clean straight cut-off on the wire will help keep the flow of metal well balanced.

★ ★ ★

The type of metal being headed and the type of header also determine the techniques and dies to be used.

★ ★ ★

Excess metal is trimmed from the head of the bolt by a cutting die that follows punch operations.

★ ★ ★

Head forming is sometimes done by turning, but forming by punch blows produces a stronger head and has generally replaced this method.

Reducing Blank Diameter for Threading

After the blank has been headed, the diameter of the other end is reduced for threading by extrusion.

★ ★ ★

Extrusion is both fast and accurate. It is now replacing the older swaging method that has been standard practice in many bolt-making plants. The end of the blank is simply forced through a die of reduced diameter. This results in a round, smooth section for rolling threads.

★ ★ ★

Another tool cuts the other end of the blank so that the final product is pointed as necessary.

Roll Threading

The thread may be rolled onto the bolt, or cut. Roll threading is by far the most commonly used process because of its accuracy and speed.

★ ★ ★

Roll thread dies are milled, hardened and ground, with the thread rolling grooves having the correct angle and pitch to give a perfect thread when a blank of the correct diameter is rolled between them.

★ ★ ★

In the conventional roll threader, one die is held stationary in the machine while the other slides past, rolling the blank along the stationary die from one end to the other.

Washing

After fabrication, bolts must also be washed to remove oil, grease and metal chips picked up in processing. This is done either before special processing or when the bolt is ready for inspection. Frequently, bolts requiring special processing go through several cleaning operations. Washing is done in revolving barrels equipped with a washing chamber and a drying chamber.

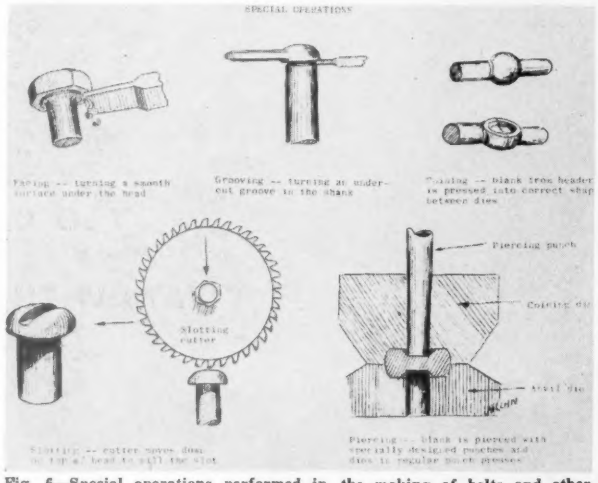
SPECIAL OPERATIONS
Facing -- turning a smooth surface under the head
Grooving -- turning an undercut groove in the shank
Coining -- blank from header is pressed into correct shape between dies
Slotting cutter
Piercing punch
Coining die
Pierced die
Slotting -- cutter saws slot in top of head to mill the slot
Piercing -- blank is pierced with specially designed punches and dies in regular punch presses

Fig. 6—Special operations performed in the making of bolts and other cold headed products.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

While these dies are precision tools, it takes skill to set them up. Slight misalignment results in poor threading, which is difficult to discover before the bolts are thoroughly gaged in inspection. Setting up threading dies is one of the most critical operations in bolt manufacturing.

★ ★ ★

Almost all bolts up to one inch diameter are threaded by rolling. On larger diameters, threads are cut from full size rod.

Special Fasteners

Standard bolts, produced in the manner described above, make up the largest volume of production. However there are many applications in industry requiring special operations in the manufacture of bolts. Some of these operations are illustrated in the accompanying drawings. Other operations include various heat treating methods, electroplating and chemical treatments.

★ ★ ★

Inspection and Testing

Finally, bolts are inspected and tested to insure that they are within specified tolerances and will not break in service.

★ ★ ★

Inspections have been made periodically throughout production to insure that machines are correctly adjusted to lessen the possibility of rejections on final inspection.

★ ★ ★

In final inspection, a specified number of bolts from each lot is taken at random and measured to determine whether they are within prescribed tolerances. The number taken for inspection depends upon statistical quality control procedures and the quality requirements of the particular lot. Bolts also undergo head tests, wedge tests for soundness, tensile and hardness tests.

(*Please turn to page* 458)

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A Practical Approach To The Extrusion Of Thermoplastics

by Wallace Hooper
Polychemicals Department
E. I. duPont deNemours and Company, Inc.
Wilmington, Delaware

This paper was presented at the Signal Corps' Fifth Annual Symposium on Communication Wire and Cable at Asbury Park, N. J., on December 6, 1956.

Application of thermoplastic insulation and jackets by extrusion coating to produce long-lived wire and cable coverings of outstanding quality is a simple process. Basically, all that is required is an extruder and a means of cooling the hot plastic. Completely eliminated are such slow and costly operations as wrapping and vulcanizing. However, there has been in the past a feeling that the extruder itself was extremely complicated.

★ ★ ★

A conviction that beneath this superficial complexity lies a basic simplicity has led over the last few years to an intensive study of this machine. The reference articles 1, 3, 4, 5, 6 are a part of the bibliography of the subject. This study has produced a new understanding of, and quantitative expressions for, the patterns of flow in an extruder. Further, it has made it possible to develop a rational, practical system of extruder operation. I would like to discuss such a system today.

★ ★ ★

To assure basic agreement on the terms to be used and the physical manifestations of these terms, I would like to refer to a representative extruder. (Figure 1).

Cubes, spheres, cylinders or other relatively large solid particles of plastic are fed to the hopper of the extruder. These are carried forward by the screw to the melting zone where the temperature is raised to the point of fusion. From here, the molten plastic is transported, usually by way of a compression section, through the melt conveying section, to the head and die. Because flow in the head—practically always a crosshead in wire and cable manufacture — is streamlined, with little mixing, it is essential that the resin be thoroughly plasticized b e f o r e it reaches this section of the extruder. To be certain this has been accomplished, temperature should be measured at this point. An instrument to do this, the stock thermocouple, has been described elsewhere.[2] (Figure 2).

★ ★ ★

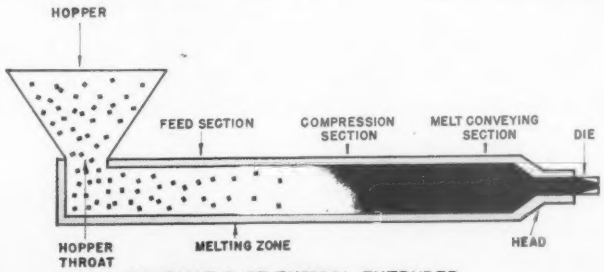
An Archimedean screw conveys the material forward and delivers it to the crosshead against the pressure of the die. Such a screw depends for its conveying action on the interaction between the shear of the material by the screw and the thrust of the advancing flights. Here in a schematic cross-section of the melt-conveying section (Figure 3) this effect can be seen. The material on each of the surfaces has the same velocity as that surface. Under iso-thermal conditions in a Newtowian fluid, the shear will be distributed proportionally throughout the cross-section. Thus, each layer of fluid will be acted upon by the advancing screw flight in proportion to its distance from the screw surface.

★ ★ ★

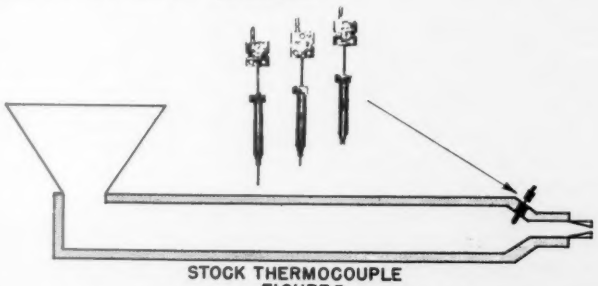
The result is a forward flow of material along a helical path within the helix of the screw channel. This path is represented in Figure 4. This action is a volumetric displacement, commonly termed drag flow and can be expressed mathematically in terms of the dimensions of the screw as follows:

$$Q_D = \frac{\pi^2 D^2 Nh \sin\phi \cos\phi}{2} \quad (1)$$

Due to inevitable losses this quantity is seldom delivered by the screw. These losses come from two sources—the pressure flow of material back down the channel of the screw, and a similar leakage between the flight and the barrel. These are defined by these expressions:



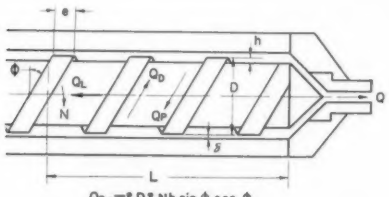
SCHEMATIC OF TYPICAL EXTRUDER
FIGURE 1


STOCK THERMOCOUPLE
FIGURE 2

$$Q_P = \frac{\pi D h^3 P \sin^2 \phi}{12 \quad L} \qquad (2)$$

$$Q_L = \frac{\pi^2 D^2 \delta^3 \tan \Phi \; P}{10 \quad e \; L} \qquad (3)$$

See Figure 5.



$$Q_D = \frac{\pi^2 D^2 N h \sin \phi \cos \phi}{2}$$

$$Q_P = \frac{\pi D h^3 P \sin^2 \phi}{12 \mu L}$$

$$Q_L = \frac{\pi^2 D^2 \delta^3 P \tan \phi}{10 \mu e L}$$

FLOW EXPRESSIONS
FIGURE 5

In a similar manner the dry solids in the rear of the extruder are conveyed forward by the screw. For zero coefficient of friction on the screw, this action is described by: [4]

$$Q_S = \pi^2 D^2 N h \sin \Phi \cos \phi \qquad (4)$$

This expression gives the average output, but because of the large size of the particles in relation to the screw channel, the instantaneous output varies as much as 15%.

★ ★ ★

To put these equations to work, we must first decide what we expect of our extruder. A statement such as follows includes most cases. The extruder should:

1. deliver material at a high rate under a broad range of conditions, and

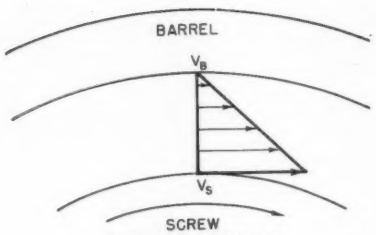
2. be insensitive to uncontrolled variables, such as ambient temperature.

★ ★ ★

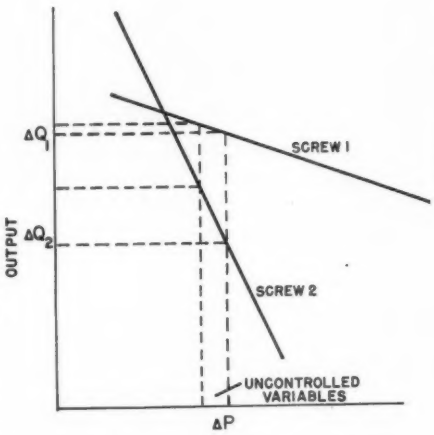
Graphically, the problem can be expressed in the manner of Figure 6, in which the locus of points of extruder delivery at a single screw speed defines the screw characteristic. Since all uncontrolled variables can be reduced to pressure, both requirements are met if this line, the screw characteristic, is high and flat.*

★ ★ ★

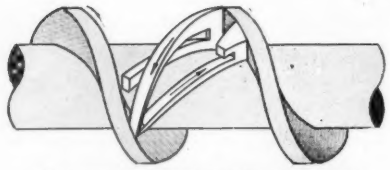
Even the most cursory examination shows us that the solution must lie in the melt conveying section where there is a minimum of gross random action. Referring to the equations for drag, pressure, and leakage flow, it would



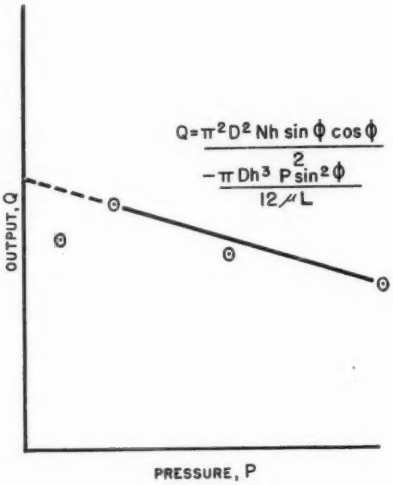
VELOCITY PROFILE
FIGURE 3



SCREW CHARACTERISTICS
FIGURE 6



PATTERN OF FLOW IN SCREW CHANNEL
FIGURE 4



DETERMINATION
OF
SCREW CHARACTERISTIC
FIGURE 7

appear that there are an infinite number of screw designs which will meet a given set of conditions. And there are. However, in practice, the problem can usually be reduced to practical size. First, leakage flow is usually so slight that it can be ignored. Secondly, as will be seen later, the helix angle is dictated by other considerations. As a matter of fact, the usual case is simply to choose a channel depth for a given size screw. This is most readily done by plotting the proposed operating conditions and connecting the extremes (Figure 7). The slope of the resulting line is that of the pressure flow, and is equal to

$$\frac{\pi D h^3 \sin^2 \Phi}{12 \mu h}$$

Or, alternatively, the slope can be set from quality standards and previously accumulated data of the pressure fluctuations which may be expected from outside sources.

★ ★ ★

The slope equation can be simplified if reasonable limits are set for some of the variables as follows:

$\phi = 17.8°$ for efficient feeding in feed section (Figure 8) and to maintain constant pitch for ease of machining.

L = 4D to keep a reasonable proportion between feed and melt zones.

Substituting:

$$\text{Slope} = 6.14 \; (10)^{-3} \frac{h^3}{\mu}$$

The intercept at zero pressure can be solved for the necessary screw speed. Or, if not previously determined, a diameter and screw speed combination may be selected from this point.

★ ★ ★

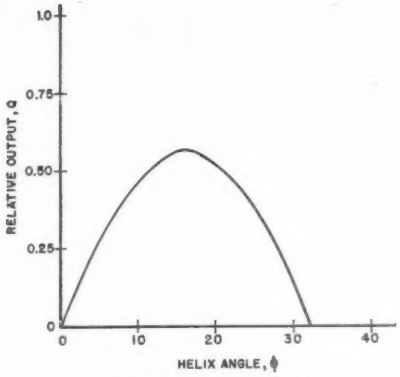
The rest of the screw design problem is to make sure the feed and melting zone does not starve the melt conveying section. This requires reference to the dry sol-

***For a single purpose screw, the optimum channel depth is given by J. F. Carley, et al., as**

$$h = \sqrt[3]{\frac{6Ku}{\pi^2 D \sin^2 \phi}}$$

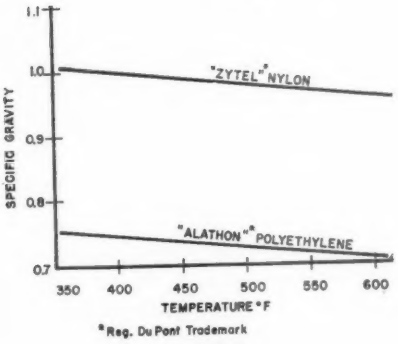
Where K is the die constant and is equal to

$$\frac{Q\mu}{P}$$



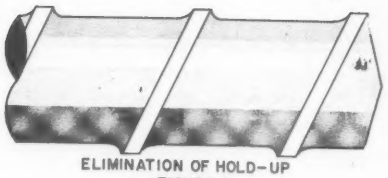
EFFECT OF HELIX ANGLE ON SOLIDS CONVEYING

FIGURE 8



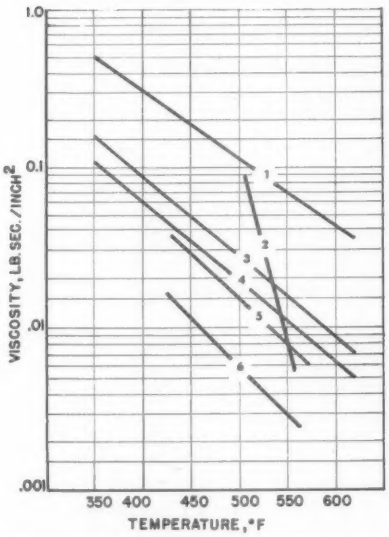
*Reg. Du Pont Trademark

FIGURE 11



ELIMINATION OF HOLD-UP

FIGURE 9



1. "ALATHON"* 4, BK-20
2. "ZYTEL"* 101, NC-10
3. "ALATHON"* 5B, NC-10
4. "ALATHON"* 5L, BK 22
5. "ZYTEL"* 33, NC 10
6. "ZYTEL"* 3606

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VISCOSITY OF WIRE-COATING RESINS

FIGURE 12

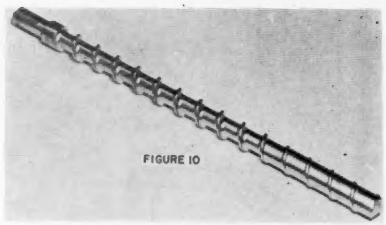

Table 2

Data Summary Sheet

Screw Speed rpm		Calculated	Tubing Die	14 AWG Die	22 AWG Die
10	Q	0.22	0.25	0.21	0.05
	P	-	54	465	1900
20	Q	0.44	0.50	0.42	0.18
	P	-	102	718	2510
30	Q	0.67	0.75	0.63	0.33
	P	-	145	852	2880
40	Q	0.89	1.00	0.84	0.47
	P	-	184	953	3190
50	Q	1.11	1.25	1.05	0.62
	P	-	217	1048	3440
60	Q	1.33	1.49	1.254	--
	P	-	243	1133	--

Q = output, in^3 per sec.
P = pressure, lbs. per sq. in.

ids conveying equation (4) and these factors:

1. The coefficient of friction is not zero, but is about 0.5 for most plastics. This output is about 50% of maximum for this case, (Figure 8).

2. The material fed has a bulk density well below that of the melt, usually about 50%.

3. A deliberate overcapacity should be designed into the feed section to positively avoid starving.

★ ★ ★

In view of these factors, a channel depth in the feed section four times that in the melt section seems a good level.

★ ★ ★

When it is performing properly, the feed section provides an

(*Please turn to page* 458)

EXTRUDER PERFORMANCE CHART

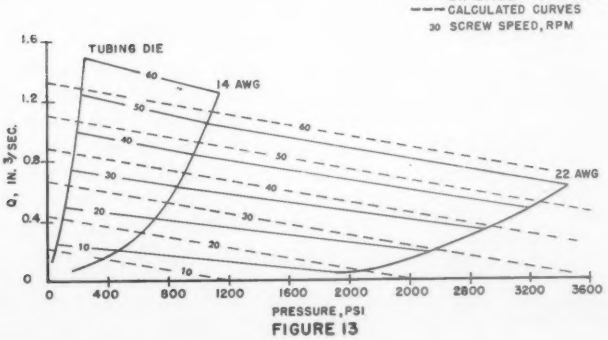

FIGURE 13

Table 1

Example Calculations for Figure 13

Extruder: 3 1/4" Davis-Standard — Resin: "Alathon"* 5B, NC-10

Screw: Constant lead, sudden compression, metering type. Dimensions.

$e = 0.325"$, $h = 0.110"$, $L = 14"$, $\delta = 0.004"$, $\phi = 17.8°$

Screen pack: 2 - 80 mesh

	22 AWG coated to O.D. = 0.055" (15 mil wall)	14 AWG coated O.D. = 0.126" (31 mil wall)	Tubing Die
Die:	I.D. = 0.056" 6° approach angle no land	I.D. = 0.127" 15° approach angle no land	I.D. = 0.210' O.D. = 0.500' no land
Stock Temperature, °F =	500	500	500
Screw speed, rpm =	8 - 53	10 - 81	10 - 80
Wire speed, fpm =	100 - 1950	85 - 1100	-

Drag flow $= \frac{Q_D}{N} = \frac{\pi^2 D^2 h \sin\phi \cos\phi}{2}$

$= \frac{(3.14)^2 (3.25)^2 (0.110) (0.306) (0.952)}{2}$

$= 1.67\ in^3/rev.$

Correction to room temperature:

$\frac{Q_D}{N} = 1.67 \frac{in^3}{rev.} \cdot \frac{\text{density at extrusion temperature } 0.73}{\text{density at room temperature } 0.92}$

$= 1.33 \frac{in^3}{rev.}$

Screw characteristic:

$\frac{Q}{P} = \frac{\pi D h^3 \cos^2\phi}{12 \mu L}$

$= \frac{(3.14)(3.25)(0.110)^3 (0.952)^2}{(12)(0.038)(14)}$

$= 1.93\ (10)^{-4} \frac{in^3}{sec.\ lbs.\ per\ sq.\ in.}$

* Registered du Pont trade-mark

Automatic Control of Furnaces Used in Wire Processing

by Leo Walter
Consulting Engineer
Eastcombe, England

Part B

Automatic Control of Furnace Combustion and Temperature

In Part A, published last month, the author discussed the fundamentals of automatic temperature regulation of industrial furnaces. This installment completes the series.

Heat treatment in industrial furnaces has become more scientific in recent times and automatic control instruments are widely used. They regulate one or several factors of furnace operation, such as temperature, draught or pressure, composition of furnace atmosphere and other "process variables." As a heat flow process the heat treatment of metals depends on efficient combustion of solid, or liquid or gaseous fuels in the furnace chamber, with exception of electrically heated furnaces, where heat is produced by sheathed resistance elements.

★ ★ ★

The great diversity of furnace types, the variation of purpose, the differences in furnace size and in the fuel used makes it necessary to deal with the basic principles of furnace control first. It is possible to look at any industrial furnace, whether a small gas-fired toolroom furnace or a very large continuous heat treatment furnace as a heat flow process, thus bringing combustion and temperature control as the most important factors under a common denomination. Other controlled process factors for furnaces can then be dealt with in a similar way, and partially or full automatic furnace control can thus be analysed generally.

★ ★ ★

Commonly used gaseous fuels are town gas, coke oven gas, water gas, and natural "rich" gases, but lean gases are also used for certain purposes such as producer gas or blast furnace gas. Liquid fuels can be fuel oil (heavy or light), kerosene, gasoline, or coal tar. Solid fuels can be coal in raw or powdered form, coke or coal on grates and sometimes wood or sawdust. The choice of fuel depends on economical, metallurgical and chemical considerations. Flame temperature and gas composition are the main factors to be considered, and any form of temperature control of furnaces consists mainly of control of the process of combustion. (Fig. 1.)

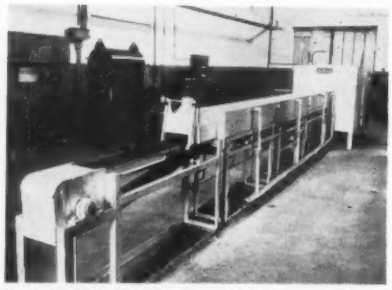

Fig. 1—Electric Conveyor Band Furnace for Brazing Small Parts.

In heating of industrial furnaces electricity plays its part in increasing numbers. It is the cleanest and best controllable source of heat, readily convertible and normally always on the spot. Electricity is usually sold by the kilowatt hour, which equals 3413 B.Th.U's. Where water power is available, or where electricity can be generated by burning natural gas in power stations, or in countries where any other fuel has to be imported, electrical furnaces are widely used. The load factor influences the cost of operation, and steady use is preferable for reasons of economy. It it often advisable with a number of electric furnaces to heat up slowly in order not to overload the generating station, or to stagger operation.

Typical Furnace Control Panel.

★ ★ ★

In some types of electrical heat treatment furnaces, where a specific furnace atmosphere is required, special additional fuel burners have to be used to produce combustion which adds desirable gases to the otherwise clean air in the electrical furnace. Neutral atmospheres containing nitrogen can thus be created, or carbonization factors can be introduced and varied at will. With fuel-heated furnaces, however, the nature of the furnace atmosphere can be influenced by combustion control. Obviously the use of liquid or gaseous fuels makes regulation of furnace temperature and atmosphere easier than when burning solid fuels, but in any case fuel to air ratio is a decisive factor.

Combustion Appliances and Controllability

Good controllability of combus-

tion devices is a prerequisite for success or failure of automatic furnace control. The usual heat flow in a furnace proceeds from (a) source of heat, to (b) furnace itself, to (c) furnace charge, to (d) heat lost via exit gases, radiation, etc.

★ ★ ★

Whatever the source of heat in a furnace is the purposes of heat flow are as follows:

(1) To maintain a controllable furnace temperature, or more precisely a readily controllable charge temperature.

(2) Heat distribution should be performed inside the furnace to produce uniform charge temperature.

(3) Where a special furnace atmosphere is required, such as neutral, or reducing, or oxydizing, the source of heat should be adaptable to the demand.

(4) The nature of the flame resulting from direct combustion should be controllable, for example either producing an instantaneous hot flame, or in another instance delayed combustion with a "lazy" flame.

★ ★ ★

A rough classification of combustion appliances can be made into good controllable devices, such as certain oil or gas burners, or into less controllable appliances such as mechanical solid fuel stokers, fire-grates, etc. Most gas burners are equipped with a pilot flame, which enables "on/off" temperature control, and with automatic flame failure devices, which prevent danger of explosions. The primitive method whereby a gas pipe and an air pipe are located so that mixture and ignition occurs in the furnace chamber have been superseded by mixing devices for gas and compressed air in the burner. Preheating of the air for combustion is applied for certain types of larger furnaces in order to increase efficiency of combustion, and this preheating is performed in recuperators. Some types of nozzle-mixing burners are very efficient and controllable. Diffusion burners, luminous flame burners, smoke burners, cracking and mixing burners have been devised for producing a luminous flame with better heat transfer by radiation. Burner types with adjustable flame luminosity are preferred for modern furnaces. Mixing of gas and air can be obtained by partial pre-mixing, affected partly outside the furnace chamber, and partly inside.

★ ★ ★

For example, an injector burner where the gas induces the air, starts mixing outside but finishes mixing inside the furnace chamber. It can be safely stated that gas burners which produce complete mixing are better controllable than other types. Furnace types using gas and air under pressure are very controllable, and so are some types using gas and part of air under pressure with remainder of air induced by nozzle effect. Total premixing of air and gas produces smallest combustion volume with good controllability of temperature. Various means are applied for prevention of "lighting back" of gas burners, such as by-passing the explosive mixture through small holes of a refractory block at the inlet to the furnace chamber, or using a refractory screen.

Using Gas

A complete gas-combustion system consists of a device for moving air and gas, of supply pipes, of an apparatus for mixing air and gas, and of one or several gas burners in or at the furnace. Different combinations of these elements are applied in practice, and temperature conditions and flame qualities determine their use. The number of temperature regulators for gas firing is very great and the sensing element may be either a pyrostat or some form of photo-electronic detecting device. The well-known small thermostats for gas burners use sometimes bi-metal elements. For larger gas flows so-called gas relay valves have to be used. Sometimes a gas relay valve is used and an expansion thermostat which combination can be applied for temperatures up to 700°C, or over.

Fig. 2—Automatic Control of Gas-fired Carbonising Furnace.

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Relays valves are also used for employing an outside source of power, such as compressed air, or oil or water under pressure. Apart from correct choice of pyrostat type and best possible location of the latter within the furnace chamber, it is the selection of the type of gas regulating valve and its installation which often determine accuracy of control. For example, a motorized gas regulating valve for medium-sized heat treatment furnaces works in conjunction with a thermocouple and on/off electrical furnace controller. A combined stop and pre-set valve is inserted in the gas supply line to the furnace burner, which valve allows hand control to be performed when the control automatic valve is serviced.

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It is obvious that gas supply pressure to burners should be steady, and where it fluctuates in practice the use of a pressure governor is essential. For lower gas pressures the motorized valve may be of the butterfly type and can be actuated by a control motor fitted on top. A by-pass is provided for to maintain a minimum gas flow to burners all the time, and an adjustment valve in the by-pass allows correct setting or re-adjustments to be made by hand. A U-tube manometer in the main gas supply to burners should be used indicating the gas supply pressure. "On/off" or "two-step" mode of control is usually applied for simpler control conditions whereby the burners take up a "high" or a "low" flame position. The well-known chopper bar mechanism of electrical controllers allows in other instances

"gradual" or "inching" control, whereby a gas control valve takes up intermediate positions between fully open and fully closed, according to the magnitude of deviation of actual furnace temperature to the desired or "set" temperature on the control instrument.

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During the last years the use of electronic temperature controllers has become widespread because of their small instrument time lags and good accuracy. Likewise the use of electronic flame control devices for furnaces has become very popular, which prevents an explosion in case of supply disturbance to occur.

Liquid Fuel Combustion

It is usually the oil or tar vapour which burns if mixed with air. Producing oil droplets by atomization is thus part of the duty of any oil burner type, but sometimes simple vapourizers may be used, for example using a drip burner and pre-heated air. Atomizers use either liquid fuel under pressure, forced through a small orifice, or high velocity atomization by means of a high pressure air-or-steam stream. Mechanical atomization using liquid fuel pressure can use centrifugal force in the burner nozzle, or flat spray burners. Air or steam of 60 to 125 p.s.i. pressure can be used for high pressure burners, or air up to 2 p.s.i. for low pressure atomizing burners.

Controllability of an atomizing oil burner depends on its quality to allow alteration of inflow of oil and air and to proportioning their ratio as required. It is a fact, however, that many oil burners atomize and mix oil mist with air under various load conditions of the furnace, but they do not maintain a constant oil/air ratio. Thus burner efficiency varies during control action, whether performed manually or automatically. Fan blast air is required for oil pressure atomization, which provides an additional means for combustion control, additional to control of oil pressure. By varying both oil pressure and air volume, the length of flame can be regulated as desired. One point to be considered before fitting automatic control to an oil-fired furnace is the non-coking quality of the burner type used.

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It might sometimes pay to take the opportunity and exchange an old burner design against a more modern one, having non-coking quality and good controllability. The question of furnace pressure control for larger heat treatment furnaces has been adequately solved by the design of new very sensitive pressure regulators.

Time Pattern Control

Progress in metallurgy and in heat treatment has brought in its stride development of time-temperature control, sometimes called programme or time-pattern control of furnaces. The most commonly used instrument is a programme transmitter having a cam attachment fitted, which latter continuously varies furnace temperature at a predetermined schedule. A cut-out cam produces the time-temperature schedule above. By cutting out various cams and keeping them ready for use, quick changes can be made for a furnace operating on varying heat treatment schedules. For large open-hearth furnaces as used in the steel industry, automatic valve reversal has been developed by means of automatic timers with cam element. Compressed air is used, and three-way valves actuate a pneumatic power cylinder, which in turn operates the large valves which control gas flow through recuperators. Generally speaking it is the aim of modern designers and makers of industrial furnaces of any kind to make them into highly efficient automatic machines, requiring little manual control from the furnace operators, who will automatically become supervisors only, apart from loading and unloading operations.

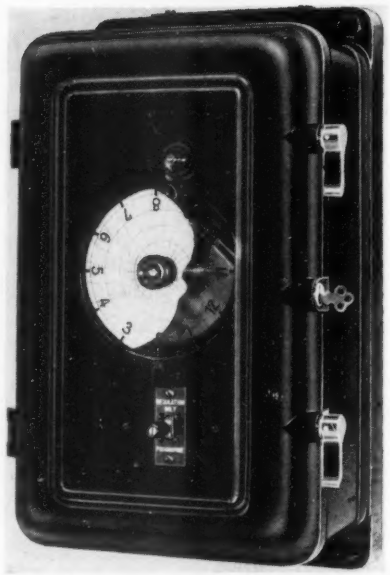

Fig. 4—Programme Transmitter with chart record for gas-heated furnace.

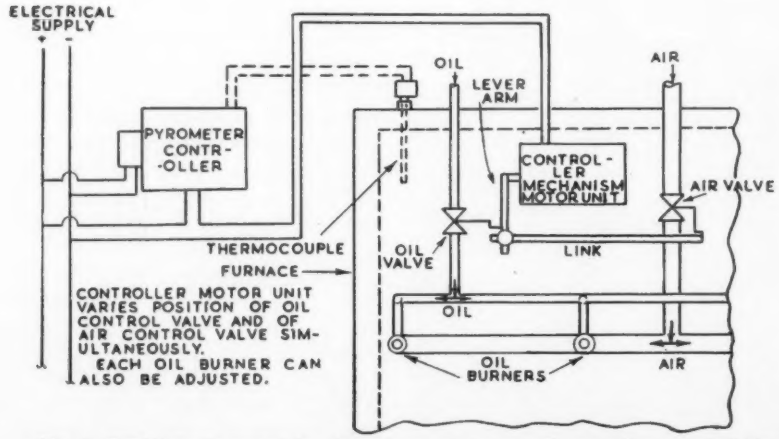

Fig. 3—Fuel/Air ratio control by electronic pyrometer controller actuating motorised Torque unit.

Firing Appliances for Solid Fuels

Although combustion of solid fuels is less controllable than gaseous or liquid fuels, coal or

coke are widely used for heat treatment furnaces. For large furnaces several combustion chambers are used, or the fuel is gasified in gas producers. Whilst the operation of hand-fired grates depends on the skill and attention of the furnace operator, mechanical stokers can be partly or fully automatically controlled, but still require some supervision. For example, even if the rate of coal supply by screw feed or ram feed has been correctly set in relation to air supply, governed by fan speed or throttling damper, the formation of ash or clinkers might upset equilibrium, and require attention. The rate of combustion required depends mainly on the required furnace temperature, and this influences rate area, rate of coal feed, and air volume used.

considerably. Annealing furnaces fired by underfeed stokers with good load recuperation lend themselves also to improvement, especially when of older design. Coal or coke fired preheating and reheating furnaces are not very controllable, and the lack of a recuperative system causes very low thermal efficiency. For some types of heat treatment furnaces, conversions from solid fuel firing to pulverized fuel increases controllability. Powdered coal is mainly used for larger furnaces, and special mills and burners have been developed. Controllability is either medium or good, according to furnace type used, and application of automatic control is advisable.

Resistor-heated Furnaces

The fact that electric current flowing through material increases temperature indicates the use of the treated material as resistor (smelting furnaces) or alternatively heating elements are embodied in the furnace design which produce radiation and convection of heat. These elements may either be located in the heating chamber, or they heat a muffle. A third heating method is that the stock is heated by induction currents.

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The types of metallic resistors are varied, and they can be cast, rolled, or drawn in form of iron wire or ribbon for low temperature work, or as alloys for nickel, chromium, etc., between 1000° and 1500°F. Special alloys have been developed for higher temperatures, having a time of life up to 2 or 3 years. Ribbon resistors can be mounted on furnace walls by means of plugs, and various shapes of grid resistors are available. Cast iron resistors or thin-walled tubular resistors are widely used, or sometimes hairpin resistors held in position by porcelain mountings. For tall and narrow furnaces, the resistors are placed on the sides only. For wide and shallow types they are located under the furnace roof and under the hearth.

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For some designs the whole inner furnace is fitted with resistors, including the door. The fact that heat generation can be controlled with great accuracy and that no air is required for combustion reduced heat losses of electric furnaces. Figures for energy consumption are for batch or pot types per gross ton from 340 K.W.L. to 540 K.W.L. for brass annealing 100 to 120 K.W.L. per ton in batch operation. The elimination of heavy containers and packing, such as in gas carburizing and in gaseous ballebleising not only reduce the time of treatment, but also increase controllability of the process. (Fig. 6).

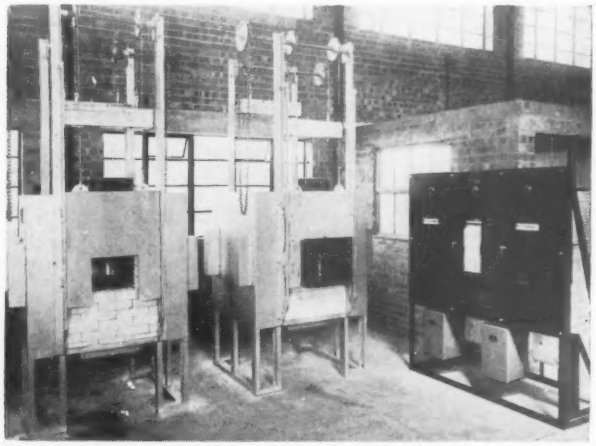

Fig. 5—Instrument panel for resistor-heated furnaces. * * * *

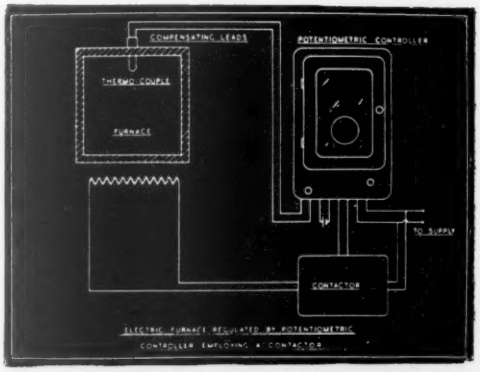

Fig. 6—Potentiometric controller with contactor regulated electric furnace. * * * * *

Furnace Thermal Efficiency

It is notable that the overall thermal efficiency of existing industrial furnaces fired with solid, pulverized, liquid and gaseous fuels range in general from about 4% to 55%, whereby the majority keep within 10% to 35%. The low thermal efficiency of many furnaces in use is due to less controllable firing caused by bad operation on part of the furnace operators. Many a furnace could be operated more efficiently by mechanical draught fans, automatically controlled. The use of mechanical stokers equipped with automatic combustion control can raise thermal efficiency figures

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The need for thermostatic control of electric furnaces is obvious, and modern thermocouples can now be used up to 1350°C in gas-fired furnaces with about 6

(*Please turn to page* 460)

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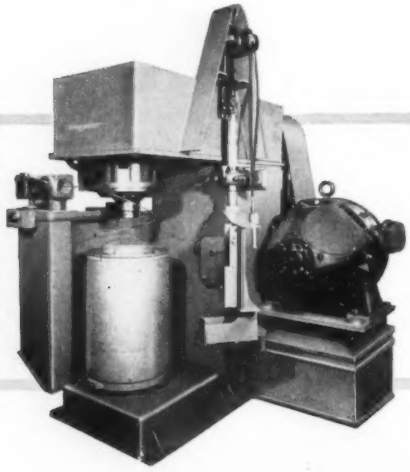

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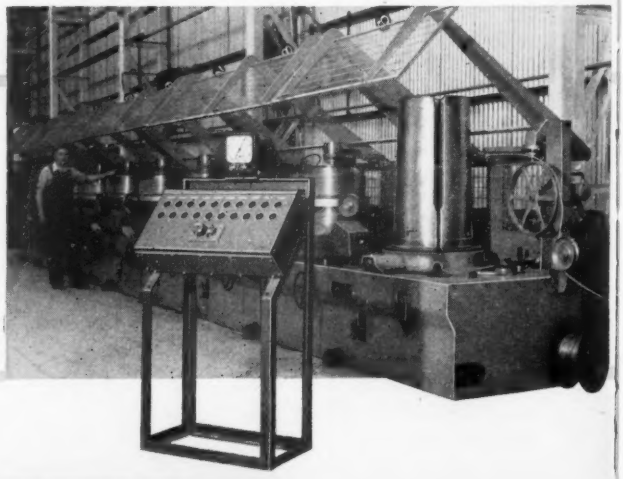

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Cleaning and Descaling Wire Electrolytically

by R. Beck

This article appeared in a recent issue of Draht-Welt and is reproduced here through their courtesy. It was translated for us by Jerome W. Howe, Worcester, Mass.

Because of the never-ending search for better ways to descale rod, this article adds some fresh ideas to the subject. The author, it will be noted, feels quite certain of his ground.

Electrolytic cleaning and descaling of wire up to now has not met with general acceptance, because of the high investment required, the expenditure for electric energy and high operating costs. From the standpoint of operating expense, however, there is an advantage in the shorter time required for cleaning and descaling electrolytically. The opinion was held until recently that the yield of poisonous waste water, characteristic of chemical methods, can not be eliminated by means of electrolytic cleaning and descaling. Associated with this also is the unsolved problem of how wire in bundles can be satisfactorily cleaned and descaled by electrolytic methods. It was said justifiably that electrolytic cleaning and descaling by older methods were so uneconomical and impractical relative to chemical pickling that no consideration need be given to the process. However, if the matter were examined carefully, one had to confess that the former purely chemical methods did not represent the ideal solution, especially if one took into account the qualitative aspects of the matter.

The Shortcomings of Present Methods

No expert would seriously dispute:

(1) That wire treated by the purely chemical methods resulted differently from a freshly prepared pickle than from a gradually used-up one, or, if this were activated thermally to higher activity;

(2) That accordingly the qualitative properties of wire out of a fresh pickle are different from those out of one tending toward saturation with $FeSO_4$;

(3) That wire with such different properties—greater or less cleanness, greater or less hydrogen-diffusion, for example — result differently in the subsequent wire drawing, at the least demanding more or less high expenditure of drawing material or have more or less wear as a consequence; and

(4) That only the most exacting production controls make it possible to prevent the maximum combination of all these disadvantages.

* * *

The purely qualitative absolute maximum effects are not included in the above-mentioned four considerations. For example, the so-called wire grooves that still occur on the wire surface with scale-attached pitting, mostly not completely eliminated by chemical pickling; these produce in subsequent drawing, as also in later electrolytic and/or static processing, especially hot galvanizing, a noticeably unsatisfactory product.

* * *

The foregoing statements point out the factors that play a more or less serious role in wire cleaning and descaling. They also show that the question of operating costs, in view of the many factors, is a relative one and that the faults apparent in end products must be included in the determination of these operating costs.

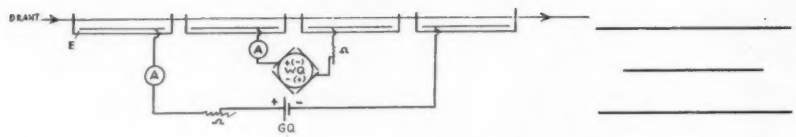
The New Patented Electrolytic Process

Electrolytic cleaning and descaling has the advantage that the end product is uniformly satisfactory and of highest quality. It is reliable, with no foreseeable faults. The question is therefore only whether electrolytic cleaning and descaling, with its qualitative advantages, can compete economically with the older chemical processes.

Under the German Patent No. 885,333, electrolytic cleaning and descaling is economically possible generally only in passage through different electrolytic treatment phases in a fully automatic process. Every electrolytic treatment presupposes that the article to be treated is above all satisfactorily degreased. An effective and uniform degreasing process is required for the electrolytic process. This is especially the case for the wire cleaning and descaling because this electrolytic degreasing (surface cleaning) is a proper preliminary to the immediately succeeding electrolytic descaling in a fully automatic continuous process. The descaling proper will then be accomplished in a suitable electrolyte through use of an alternating current with frequency (according to the kind of scale, for example, annealing or rolling scale) of 0 - 100 Hertz. It may be that an anodic final treatment is joined to this descaling process that would be equivalent to an electrolytic surface polisher.

Continuous Treatment by Separate Stages

This process in different treatment steps would be neither technically nor economically feasible if the electric current had to be supplied to the wire through contact rollers. Aside from this, sparking between the wire and the contact rollers could not be avoided. Sparking would cause martensite pockets, that would lead to increased die wear and to wire rupture. Wire can be electrolytically cleaned and descaled only when the wire itself forms the reciprocal electrode pole in each individual stage of the process as described above. The accompanying diagram shows such an electrolytic succession of



treatments.

* * *

According to the requirements and the condition of the wire to be treated, the several steps of the process can be varried. Common iron wire which will be immediately galvanized, for example, is subject (directly after the annealing) to the succession of steps: cathodic-anodic degreasing, alternating current treatment. Steel wire on the other hand should be treated in the order shown in the diagram. As required, further electrolytic and/or static steps of treatment can follow in sequence, as perhaps galvanic copperplating and galvanizing.

Operating Speed

The running speed of the wire depends principally upon the nature of the scale to be removed; in this process wide variation is possible, i.e., the speed may be accelerated or retarded. For example, if some 30 feet is available between annealing furnace and galvanizing pan, which is usually the case, then such a cleaning-descaling unit can be installed in a space that will permit of maintaining whatever running speed is dictated by the annealing process.

* * *

In such a layout 3 to 19 gauge wire can be run through at a velocity of 35 to 100 feet per minute. According to the kind of scale, in the alternating current source either a transformer (50 Hz) or a single phase frequency generator (5- 20 Hz, adjustable) is needed. With a light annealing scale, a transformer will suffice, while for rolling scale a single phase frequency generator will be needed. The current density required here moves with either direct or alternating current between 5/16 and 1/16 amp. per sq. in. of wire surface.

Absolute Cleanness Assured

Such electrolytically cleaned and descaled wire will remain uniformly in an absolutely clean and satisfactory state. The wire surface is perfectly clean even under the magnifying glass and shows no sign of oxide residue or other impurities. Any expert will realize what that means with reference to subsequent further treatment of the wire. It is not only the visible shortcomings that are of importance, but quite as much the invisible, especially the consideration that through these electrolytic treatments — in the given case, anodic — every bit of hydrogen is eliminated, or rather, all hydrogen-diffusion is prevented during the cleaning and descaling.

The Problem of Waste Water is Solved

By this process the several stage treatments assure—through precise control of current, appropriate choice of electrolyte, speed of transit and uniformity of performance—the most satisfactory results, with no increase in expenditure of energy or material. The electrolytic treatment is carried on, except for subsequent requirements of wire drying, wholly at room temperature, thus requiring no thermal expenditure. It is well known that in the chemical treatment with thermal application, the pickling acid through concentration of iron sulphate reaches a saturation of 360 - 400 gr. per liter, which makes further pickling impossible, with electrolytic cleaning and descaling a saturation degree of 600 gr. per liter of $FeSO_4$ and over can be permitted. With this saturation and with the existing customary room temperature, $FeSO_4$ crystallizes out naturally and can be readily removed. And with all this, the residual quantity of electrolyte does not produce a poisonous waste water, but can be entirely regenerated. The yield of so-called poisonous waste is restricted to the intermediate flushing of the wire sometimes required at the different stages of the process. The water contaminated with $FeSO_4$ is not injurious and is insignificant.

Subsequent and Special Treatments are Facilitated

Through the most extensive possible variations of this process every kind of wire can in this manner not only be descaled, but also perfectly cleaned and, when desired, simultaneously polished. The process especially is suited to the thorough cleaning of copper and alloy wire, as a preliminary to subsequent lacquering or enamelling. Along with the absolute cleanness of the wire, there is no attrition of its material, so that the exactitude of its cross-section is undisturbed. All requirements, including special demands, can be satisfied.

Relative Production Costs

Finally, a word as to the production costs of this new method.

* * *

Without going here into the details of cost for cleaning and descaling by chemical and/or mechanical methods, electrolytic descaling production costs will vary from $2.40 to $3.60 per ton, according to the kind of cleaning to be done. If this is taken as a base, then it can be stated that production costs for the above described electrolytic process are nowise higher and usually lie near the minimum limit quoted.

* * *

Using the electrolytic process for intermediate annealed iron and steel wire, the similarly reckoned production costs are from 20 to 40% lower. Exact production costs can, however, only be determined by a consideration of the existing individual industrial circumstances.

Molded Plastic Bobbins and their Relation to Insulated Wire Costs

The data on the use of a new type of bobbin or reel in let-off equipment is based on a case history visit to Simplex Wire and Cable Company, where Aaron A. Loomis, Assistant Manufacturing Engineer, was interviewed.

Wire industry engineers are being called upon more than ever to deliver a three-phase "must"—greater production, higher quality and lower manufacturing costs.

★ ★ ★

At the **Simplex Wire & Cable Company** in Cambridge, Mass., engineers say the best way they have found to stay on top of this task is to maintain constant research on anything that can possibly be investigated in production methods. The company was founded in 1885 and has consistently been an industry leader in using new methods developed through research. Simplex ranks at the top in the nation's production of telephone communication wire, and power and signal cables.

★ ★ ★

One of the biggest problems the Simplex Engineering Department has faced recently was that profits weren't increasing in a proper ratio to production. The answer rested with only one thing—production costs.

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The company set up a quiet but vigorous campaign to re-examine each step in production. Step by step, department by department, everything was checked. And it

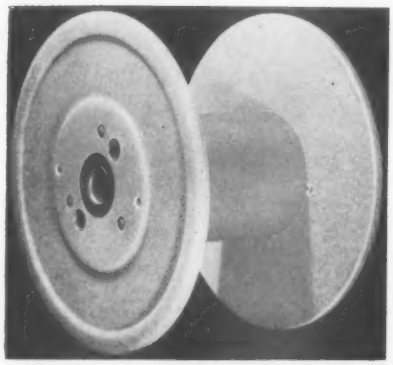

Fig. 1—General appearance of molded glass fiber reinforced plastic bobbin.

was not a matter of a day or two; it took months, but a lot was learned.

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Investigation revealed that one of the chief trouble spots was the type of bobbins being used in let-off operations. This is where several types and colors of wire are drawn from bobbins into the cabling machine where they are braided into cable.

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The speed with which these wires are drawn off is all-important. If one wire is out of phase, the cable will pile up. And this definitely was one cause of slow-ups. Cabling operators worked smoothly but used too much time.

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Also the company had to learn why one wire, then another and another would lose or gain speed and upset the operation.

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Another problem traced to the bobbins was damage to wire coatings. Simplex engineers delved into this and found that nails in wooden bobbins were actually slicing the coatings as the wire left the bobbins.

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Bobbins again came into the picture when Simplex looked into lost time, or machine down-time. Steel and wood bobbins weren't available at times because they were being repaired—pressed into shape or being nailed together.

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Dents in the steel bobbins, incidentally, were the cause of pile-ups in the cabling machines. These dents could produce soft spots when wire was being reeled onto the bobbins.

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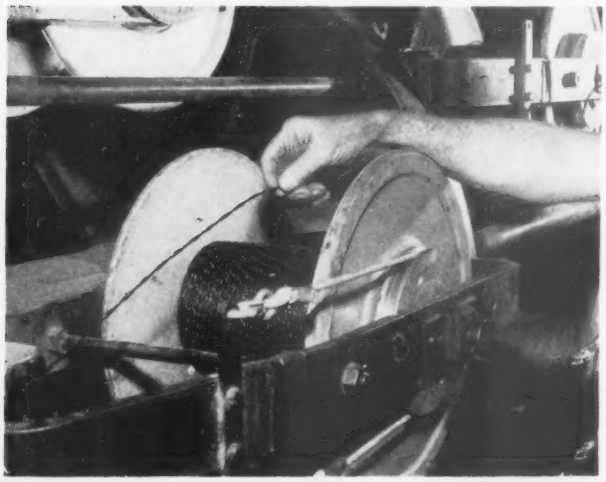

Fig. 2—(At left) Closeup of new type bobbin in place on machine that twists wires into cable.

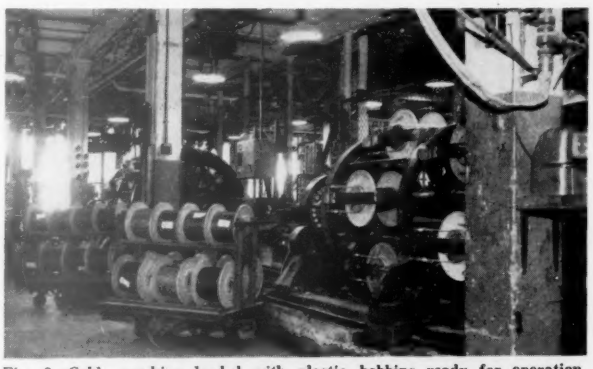

Fig. 3—Cable machine loaded with plastic bobbins ready for operation. Each bobbin is dated when placed in use for record of maintenance.

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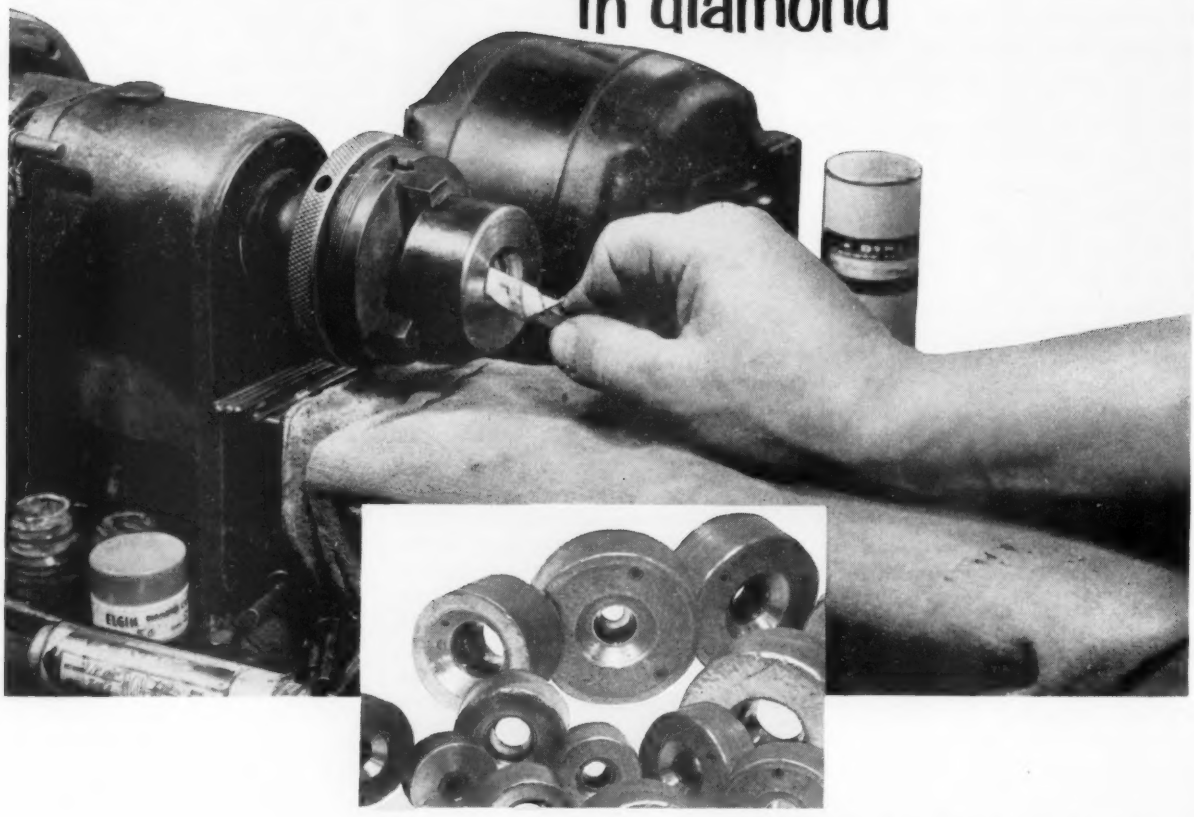

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Apparatus for Etching Fine Points

by the
National Bureau of Standards
Office of Technical Information
Washington, D. C.

This article describes an improved method of etching wire to produce symmetrical points. Additional information will be furnished by the Bureau to our readers upon request.

An improved method for producing fine points by electrolytic etching of wire under tension has been developed at the National Bureau of Standards. Although these points were constructed for use as electron sources for a field emission X-ray microscope, they could also be used as field-emission ion sources to replace the thermionic emitters in accelerators and mass spectrographs. The improved process was developed by **R. C. Placious** and **R. A. Schrack** of the Bureau's electron physics laboratory as part of a project for the Air Research and Development Command.

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The apparatus is similar to that developed by Niemeck and Ruppin for the electrolytic etching of points unnder tension, but improves the original design by employing a tensiometer to preset tension to a known value. With the accurate determination of tension, control of point size and geometry becomes possible. A high tension causes the wire to break in a shorter time and produces a larger point than a low tension with a longer etching period. Current-voltage characteristics of the points as field emitters can be quite accurately predicted on the basis of the tension applied during etching, since the size of the point determines the current emission at a particular voltage.

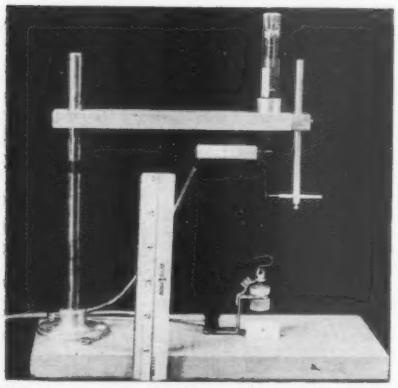

Figure 1.—Apparatus for producing fine points by the electrolytic etching of a wire under controlled tension constructed at the NBS. After the tensiometer presets the tension, it is replaced by a shank holding the wire to be etched. The wire passes through a nickel loop in which an electrolyte is inserted to form the point when current is allowed to flow. The points are so fine that they can be seen only with the aid of an electron microscope. * * * * * *

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A tensiometer consisting of a fine wire spring in a calibrated glass tube is mounted on a vertically adjustable arm. To preset the tension, one end of the calibrating spring is temporarily fastened to a tension spring mounted on the apparatus directly below the tensiometer. The desired tension on the tensiometer spring is obtained by adjusting both the vertical position of the arm and the extension of the tension spring. A pointer clamped to the arm marks the point of contact between the calibrating and the tension springs at the final tension adjustment. Also attached to the arm is a nickel wire loop containing a film of electrolytic solution. The point is formed where the wire passes through the film.

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When the desired tension has been obtained, the tensiometer is replaced by a chuck holding a metal shank to which the wire to be etched is welded. A crosspiece spotwelded to the metal shank positions the wire in the etching plane and also serves as a stop for locating the shank in the chuck. After the point has been formed this crosspiece will locate it in the field emission equipment with minimum adjustment. Attaching the tension spring to the wire at the position indicated by the pointer places the wire under the same tension set by the tensiometer.

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It is important to clean the wire before etching, and isolating the equipment from vibration and air currents aids in obtaining symmetrically etched points. Any size wire can be used but the Bureau's points were etched from 5 or 6 mil diameter tungsten wire in a 0.6 normal sodium hydroxide electrolyte. The electrolyte is inserted with an eyedropper into the nickel wire loop through which the tungsten wire passes, and 8 to 10 v dc is applied so that the conventional direction of current flow is from the wire to the loop. Varying

(*Please turn to page* 457)

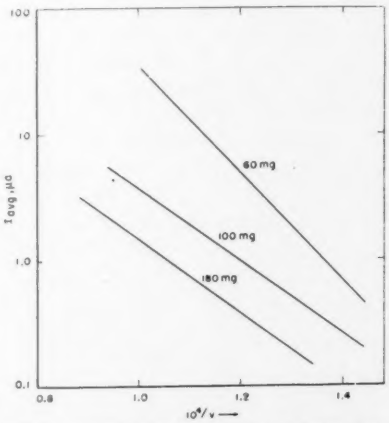

Figure 2.—Graph obtained in field emission tests of tungsten points electrolytically etched with NBS apparatus under three different tensions. Average current in microamperes is plotted against a function of the applied voltage, v. The tensions under which the points were formed is shown in milligrams. The smaller the tension, the larger the field current for a given voltage, because a small tension permits the electrolytic process to continue for a longer time and forms a finer point, due to a more concentrated electrostatic field. The slope of the graph depends on physical characteristics such as the smoothness and shape of the points. * * * * *

Aging of Neoprene in a Weatherometer

by G. N. Vacca and C. V. Lundberg

Bell Telephone Laboratories

Murray Hill, New Jersey

This paper was presented before The Signal Corps' Fifth Annual Wire and Cable Symposium at Asbury Park, N. J., on December 4, 1956.

Air oven aging at 100°C has been found useful (1) for judging the quality of black neoprene jackets. When this test is used in conjunction with an ozone resistance test (2) we believe that a good estimate of the useful service life of such a jacket can be made. These tests do not subject the jackets to light activated degradation, but it is felt that ordinarily the jackets contain sufficient carbon black to provide an effective screen against such degradation. However, one sample of neoprene jacketed drop wire returned from the field after twelve years of exposure showed some degradation on its upper surface. For this reason, it was decided to investigate the effect of comparatively long exposure of neoprene jackets in an accelerated weathering device. At the same time, it was hoped that the effect on weathering of lowering the neoprene content of a jacket could be determined.

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The weathering device chosen for this work was the one described by **V. T. Wallder, W. J. Clarke, J. B. DeCoste** and **J. B. Howard** (3) who found it useful in studies on aging of polyethylene. It was also used by DeCoste and Wallder (4) in their study of the weathering of polyvinylchloride. The machine is a National X 1A accelerated weathering unit (5) using National sunshine carbons as the electrodes, without Corex glass filters and further modified to include a curved aluminum baffle to protect the samples from the direct rays of the carbon arc for an angular distance of 90°.

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Other workers including Morris, James and Werkenthin (6), Morris, Hollister and Barrett (7) and Ford and Cooper (8) have published interesting results on the accelerated weathering of neoprene. Ford and Cooper devised a rather complete machine to investigate the effects both statically and dynamically of light, humidity and ozone and concluded that ozone was the main weathering factor which alone could produce visible effects on stocks compounded from Hevea, GR-S, neoprene and butyl polymers. The other factors i.e., light, temperature, humidity and dynamic testing caused variations in the rate of ozone attack, but did not of themselves produce visible deterioration. In all of these tests, the exposure periods were rather short, and it was decided to investigate the effect of prolonged exposure in an accelerated weathering machine to see if changes paralleled other accelerated aging procedures or outdoor exposure from which results were available.

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The work reported here involved four series of tests. For series I and series II the stocks shown in Tables I and V were prepared. In order to get maximum effect of exposure in minimum time, 0.020" sheets were prepared for exposure. The sheets were mounted on stiff panels covered with tinfoil as a means of confining exposure to one side of the sheet. At the conclusion of each exposure, portions of the sheets were removed and T50 specimens were died out for test. With the exception of Nos. 7 and 9, all of the stocks used for these two series of tests contained carbon black. Nos. 10, 11, 12, 13 and 14 were based on Type W neoprene, while the remainder were based on GN neoprene. In series I, exposure in the weatherometer was continued to a total of 3645 hours. Tensile and elongation results are shown in Table II. Table

TABLE I
SERIES I

STOCK NO.	1	2	3	4	5	6	7	8	9	10
NEOPRENE GN	100.0	-	-	-	-	-	100.0			-
NEOPRENE GNA	-	100.0					-	-	-	-
NEOPRENE W	-	-	-	-	-	-	-	-	-	100.0
MAGNESIUM OXIDE	7.0	4.0					7.0			4.0
ZINC OXIDE	10.0	4.0					10.0			5.0
ANTIOXIDANT	2.0	2.0					0.5			2.0
SRF BLACK	90.0	40.0	55.0	70.0	60.0	70.0	-	40.0	-	20.0
CLAY	-	40.0					-	-	153.6	-
WHITING	-	-	-	-	40.0		-	-	-	90.0
TITANIUM DIOXIDE	-	-	-	-	-	-	29.4	-	40.0	-
BLANC FIXE	-	-	-	-	-	-	227.5		-	-
OIL	13.0	14.3	19.6	25.0	21.4	25.0	22.0			7.1
WAX	3.0	8.0					1.8		1.8	8.0
SULFUR	-	1.0					-	-	-	1.0
PLASTICIZER	0.5	-	-	-	-	-	0.3			-
STEARIC ACID	1.0	-	-	-	-	-	1.0			-
RETARDER	0.5	-	-	-	-	-	-	-	-	-
ACCELERATOR	-	-	-	-	-	-	-	-	-	1.0

TABLE II

AGING IN THE WEATHEROMETER

STOCK NO.	1	2	3	4	5	6	7	8	9	10
	TENSILE STRENGTH P.S.I.									
HOURS IN WEATHEROMETER										
0	2075	2420	2025	1880	2020	1890	1050	1000	1050	2390
132	-	-	-	-	-	-	-	-	1020	2260
428	2110	2240	1910	1865	1800	1775	>90	825	>300	2095
916	2089	2090	1980	1680	1785	1605	-	1600	-	1320
1659	1650	1855	1775	1555	1440	1680	-	1367	-	1105
3645	1463	1690	1670	1670	1000	1107	-	746	-	-
	ELONGATION %									
0	300	580	445	400	480	455	710	350	300	620
132	-	-	-	-	-	-	-	-	125	550
428	210	395	305	260	325	300	110	90	70	480
916	160	290	245	150	225	210	-	45	-	195
1659	85	110	80	65	65	55	-	20	-	200
3645	30	85	45	45	25	25	-	20	-	45

TABLE III

100°C AIR OVEN AGING

STOCK NO. DAYS AT 100°C	1	2	3	4	5	6	7	8	9	10
0	2235	2400	2130	1945	2015	1915	685	820	920	2220
2	2425	2415	2215	2115	2040	1840	595	1070	1160	1925
4	2175	2275	2125	1990	1880	1850	715	1245	1275	3695
7	3140	2540	2850	3000	2350	2555	570	2370	1180	1725
				ELONGATION %						
0	255	485	430	340	400	375	645	275	225	500
2	210	330	255	190	285	225	155	65	80	220
4	175	250	175	120	220	195	100	40	85	380
7	30	40	30	25	35	30	90	20	60	40

TABLE IV

AGED OUTDOORS AT MURRAY HILL

STOCK NO. MONTHS	1	2	3	4	5	6	7	8	9	10
					TENSILE STRENGHT P.S.I.					
0	2075	2420	2025	1880	2020	1890	1050	1000	1050	2350
33	1380	1685	1415	1300	1215	1095	45	510	395	1120
					ELONGATION %					
0	300	580	445	400	490	455	710	350	300	620
33	125	280	200	160	235	200	50	45	150	350

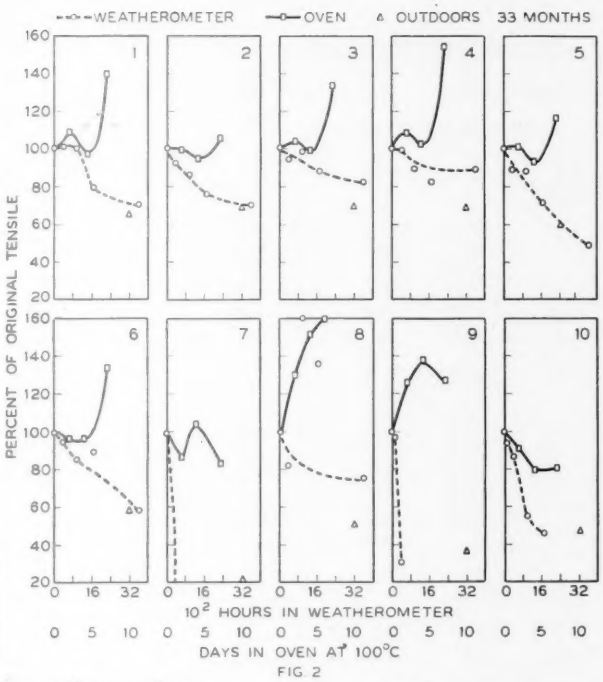

FIG. 2

TABLE V

SERIES II

STOCK NO.	11	12	13	14
NEOPRENE W	100.0			
MAGNESIUM OXIDE	4.0			
ZINC OXIDE	5.0			
ANTIOXIDANT	2.0			
SRF BLACK	50.0		90.0	
CLAY	44.5		-	-
WHITING	-	44.5	-	-
OIL	18.0		26.0	20.0
WAX	3.0			
SULFUR	0.2			
ACCELERATOR	1.25			
RETARDER	1.0			
STEARIC ACID	0.5		-	-

III gives results obtained in 100°C air oven tests while Table IV shows results obtained after 33 months of outdoor exposure. Figures I and II show percentages of original properties retained as each exposure progressed.

In series II, the weatherometer exposure ran to 2142 hours and outdoor tests ran for 54 months. Tables VI, VII and VIII give the tensile properties found for various periods during these exposures. Figures III and IV show the percentage of original properties retained in each exposure.

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The stocks used in series III are shown in Table IX. Stock No. 15 is the same as stock No. 1. It was repeated because in this test 0.075 inch thick instead of 0.020 inch thick sheets were used. Stocks 16 and 17 are jacket stocks. No. 18 is

TABLE VI

AGING IN THE WEATHEROMETER

HOURS IN WEATHEROMETER	TENSILE STRENGTH P.S.I.			
STOCK NO.	11	12	13	14
0	2435	1935	2475	2695
154	2585	2015	2555	2745
431	2255	1570	2270	2520
807	2065	1650	2053	2075
2142	1535	1005	1435	1640
	ELONGATION %			
0	485	425	350	350
154	435	365	300	300
431	370	270	255	265
2142	250	140	170	160
	65	45	50	60

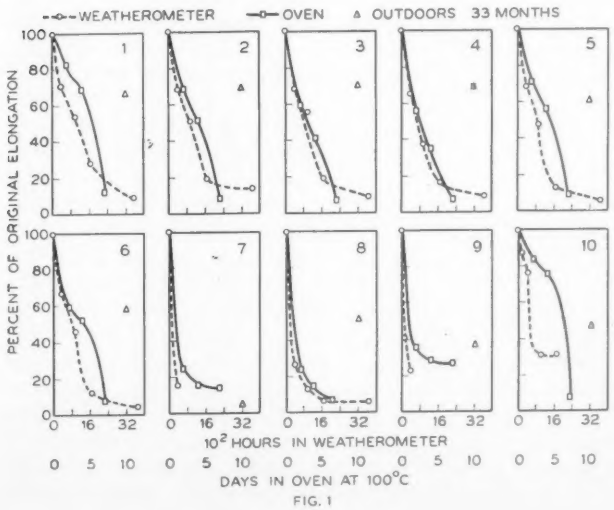

FIG. 1

TABLE VII

100°C AIR OVEN AGING

STOCK NO.	11	12	13	14
DAYS IN 100°C OVEN	TENSILE STRENGTH P.S.I.			
0	2435	1935	2475	2695
2	2595	1775	2760	3100
4	2315	1675	2765	2765
7	2890	2395	2975	3065
	ELONGATION %			
0	485	425	350	350
2	300	220	225	225
4	220	170	180	180
7	40	30	30	30

a pure gum neoprene with 10 parts of oil. No. 19 has sulfur and accelerator added and serves as a control for Nos. 20, 21 and 22 which contain increasing amounts

TABLE VIII

AGED OUTDOORS AT MURRAY HILL

STOCK NO.	11	12	13	14
TENSILE STRENGTH P.S.I.				
MONTHS OUTDOORS				
0	2435	1935	2475	2695
6	2625	1775	2405	2670
14	2625	1770	2350	2615
24	1760	1200	1690	1890
42	1785	1090	1525	1685
54	1435	795	1310	1395
ELONGATION %				
0	485	425	350	350
6	455	395	320	300
14	355	295	245	240
24	300	230	205	195
42	290	225	180	170
54	205	165	150	140

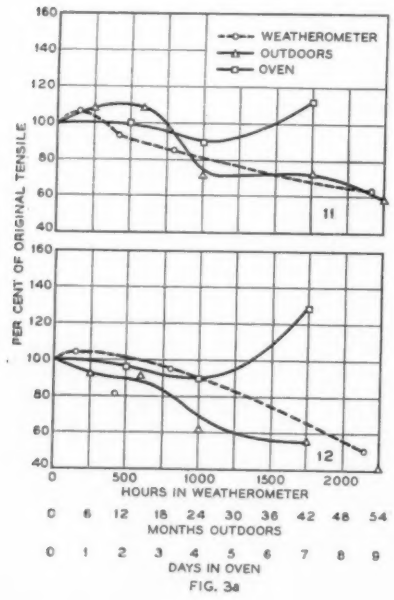

FIG. 3a

of carbon black. These stocks were exposed only in the weatherometer. As in series I and II sheets were exposed from which portions were removed at various intervals. T50 specimens died out from these portions were used for the tests. Table X lists the tensile properties found after various exposures and Figure V shows the percentages of original tensile and elongation retained.

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In the fourth test, actual neoprene jacketed wire samples were used. These were exposed as straight pieces for tensile tests and as coils in which the jackets were under 20% stretch for observation. The compositions of the jackets are shown in Table XI.

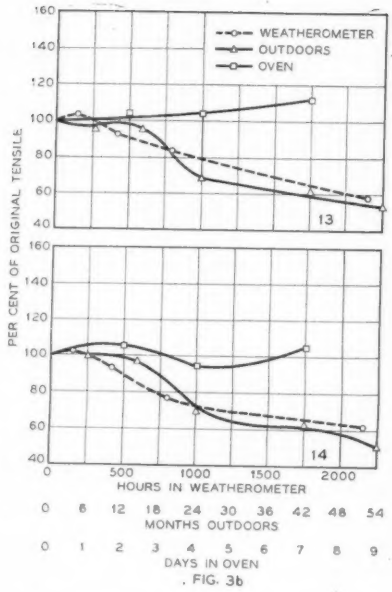

FIG. 3b

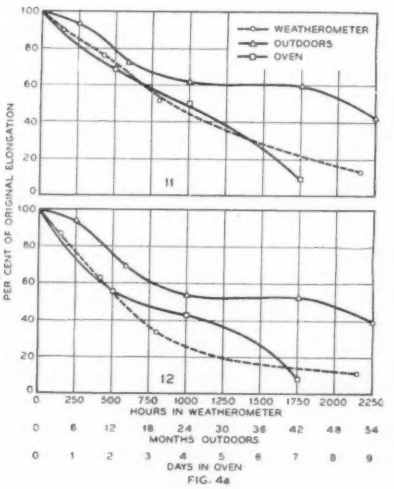

FIG. 4a

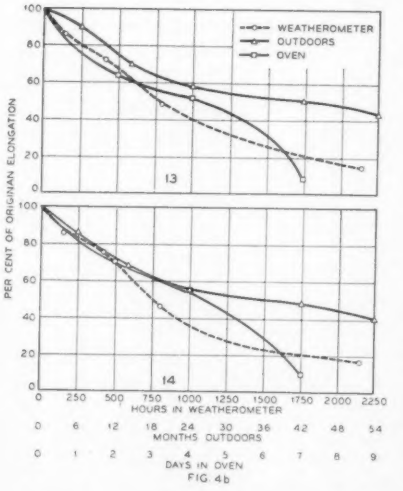

FIG. 4b

TABLE XI

SERIES III

STOCK NO.	15	16	17	18	19	20	21	22
NEOPRENE GN	100.0	-	-	-	-	-	-	-
NEOPRENE GNA	-	100.0	-	-	-	-	-	-
MAGNESIUM OXIDE	7.0	4.5	3.0	4.0				
ZINC OXIDE	10.0	10.0	4.0	5.0				
ANTIOXIDANT	2.0	2.0	2.0	2.0				
OIL	13.0	14.3	17.8	10.0				
ACCELERATOR	-	0.5	1.0	-	1.0			
SULFUR	-	-	1.0	-	1.0			
SRF BLACK	90.0	-	50.0	-	-	10.0	40.0	90.0
EPC BLACK	-	42.8	-	-	-	-	-	-
CLAY	-	37.1	41.0	-	-	-	-	-
OAK	3.0	3.0	8.0	-	-	-	-	-
PLASTICIZER	0.5	0.3	-	-	-	-	-	-
STEARIC ACID	1.0	1.0	-	-	-	-	-	-
RETARDER	0.5	-	-	-	-	-	-	-

Two of the jackets are based on Type W neoprene, one on GN-A neoprene and one on GR-S. At the conclusions of each exposure period, several straight pieces were taken out of test. The jackets were carefully removed from the specimens and that portion of the jacket which had been exposed was taken for test. After just enough buffing on each side to remove surface irregularities, ¼ inch dumbbell specimens were died out and used for test. Duration of the exposure was 8000 hours and results obtained after various intervals are given in Table XII. Tables XIII and XIV show results of oxygen bomb and 100°C air oven aging. Figures VI and VII show percentage of original elongation and original tensile retained in each type of aging. Results obtained on a sample of wire returned from the field after nine years exposure in California are spotted on the curves.

Discussion of Results

In the outdoor and oven aging tests on Series I and Series II stocks, the change in properties was greater than had been expected. In the oven tests there was a large increase in tensile strength and a large decrease in elongation between the fourth and seventh days. The loss in elongation after seven days was appreciably greater than that found on normal sized specimens after 24 days. In the heat aging of neoprene there is a definite skin effect, the skin becomes hard and the thickness of the skin increases as the heating continues. In the small specimens, the skin effect possibly involved the whole thickness of the specimen. The loss in tensile strength outdoors was also unexpected. In all of the tests made heretofore on jackets which have been exposed outdoors for periods up to twelve years, tensile

TABLE X

AGING IN THE WEATHEROMETER

STOCK NO.	15	16	17	18	19	20	21	22
				TENSILE STRENGTH P.S.I.				
HOURS IN WEATHEROMETER								
0	1805	2065	1805	3200	2775	2995	2795	2130
400	1610	2180	1905	2150	1710	2870	2560	1950
800	1535	2120	1775	2000	1770	2710	2630	1950
1200	1245	1785	1570	1585	1420	2240	2180	1855
1593	1330	1875	1510	1565	1315	2060	2130	1865
2000	1310	1730	1670	1670	1315	2260	2145	1815
				ELONGATION %				
0	235	370	430	915	765	745	500	200
400	195	330	350	805	630	660	420	155
800	165	275	300	750	625	660	415	145
1200	115	180	175	660	550	540	320	130
1593	100	170	165	650	495	475	275	100
2000	80	120	230	630	460	505	250	100

TABLE XI

COMPOSITION OF JACKET STOCKS

SERIES IV

SAMPLE NO.	23	24	26
NEOPRENE W	100.0	-	-
NEOPRENE GNA	-	100.0	-
GR-S 1712	-	-	100.0
RPA#2	-	-	1.5
ANTIOXIDANT	2.0		3.0
SRF BLACK	50.0		25.0
FEF BLACK	-	-	25.0
CLAY	42.0		30.0
MAGNESIUM OXIDE	3.0		-
ZINC OXIDE	3.0		5.0
OIL	17.8		-
LITHARGE	-	-	1.5
SULFUR	1.0		2.0
ACCELERATOR	1.5	1.0	0.5
WAX	8.0		3.0

#25 SAME AS #23

TABLE XII

AGING IN THE WEATHEROMETER

SAMPLE NO.	23	24	25	26
HOURS IN WEATHEROMETER	TENSILE STRENGTH P.S.I.			
0	2610	2145	2620	2480
1000	3325	3035	3330	3140
2000	2430	2215	2380	2350
4000	2410	2370	2355	2295
6000	-	1980	1920	2090
8000	2155	2150	2065	2035
	ELONGATION %			
0	445	320	425	450
1000	395	255	300	360
2000	290	240	285	365
4000	220	200	235	315
6000	-	160	195	305
8000	175	150	170	220

strength appreciably below original has never been found, and it has been assumed that the only effect of aging outdoors is identical to that of oven aging, i.e., it results in further polymerization or cross linking of the neoprene. However, the results obtained on the thin specimens lead to speculation that outdoors there may be degradation or scission of the neoprene on the surface. In the thicker specimens, this surface effect may be overshadowed by the bulk of the specimen while in the thin specimens the skin may have a pronounced effect on the tensile strength.

TABLE XIII

AGING IN THE OXYGEN BOMB

SAMPLE	23	24	25	26
DAYS IN BOMB	TENSILE STRENGTH P.S.I.			
0	2610	2145	2620	2480
2	2450	1910	2255	2375
10	2125	1695	1950	2120
	ELONGATION %			
0	445	320	425	450
2	405	290	365	425
10	350	195	320	410

TABLE XIV

AGING IN THE 100°C AIR OVEN

DAYS IN 100°C OVEN	TENSILE STRENGTH P.S.I.			
SAMPLE	23	24	25	26
0	2610	2145	2620	2480
2	2520	2100	2365	2130
4	2380	2040	2270	1750
25	1985	1800	1660	2130
	ELONGATION %			
0	445	320	425	450
2	310	220	280	385
4	265	190	280	285
25	130	55	120	90

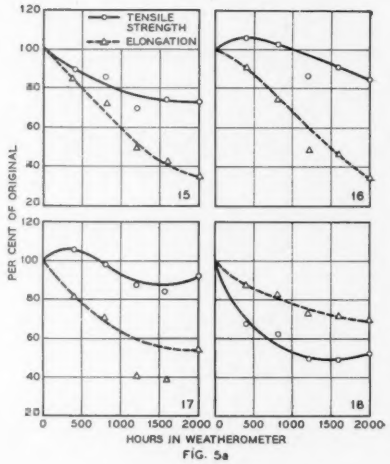

FIG. 5a

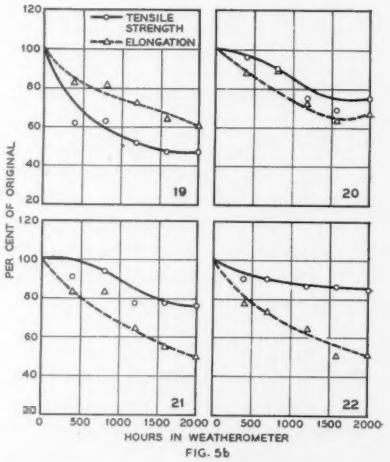

FIG. 5b

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In the weatherometer, tensile strength and elongation of the sheet specimens in Series I, II and III were lowered to a greater extent than that of the jacketed wire specimens in Series IV. This may have resulted from incomplete protection of the backs of the sheets. Elongation was degraded to about the same extent as it was after seven days in the 100°C oven. Stocks Nos. 7 and 9 which did not contain carbon black were badly deteriorated after 428 hours in the weatherometer and outdoors. Apparently there was insufficient titanium dioxide to provide a good light screen.

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Pure gum stocks No. 18 and

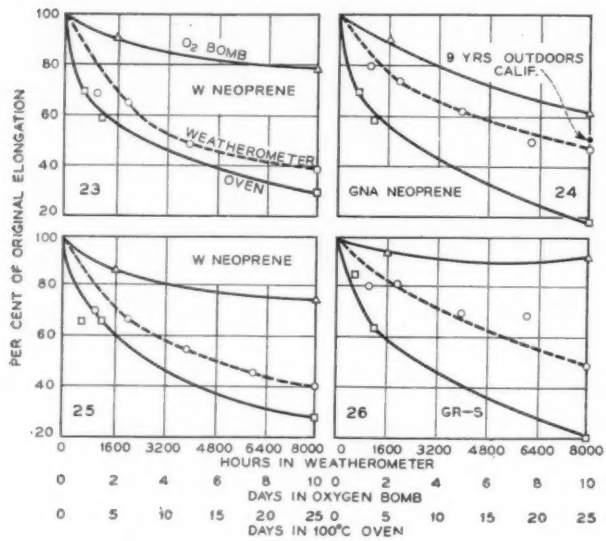


FIG. 6

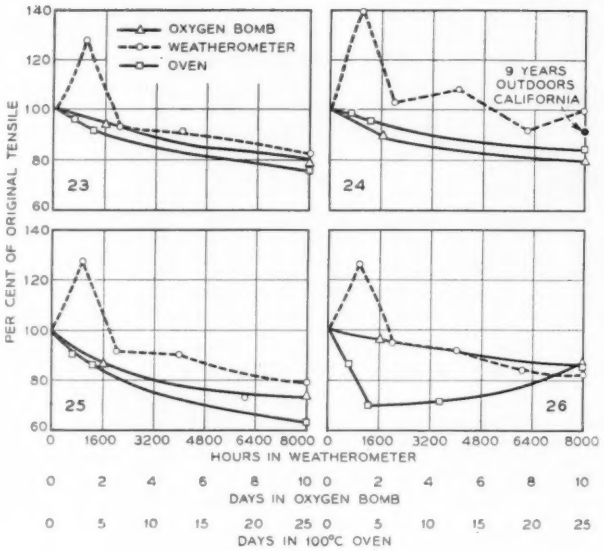


FIG. 7

No. 19 showed a greater loss in tensile than in elongation percentage wise. This was not true for any of the loaded stocks tested. The addition of 10 parts of black (#20) reverses this trend, and as the black is increased, tensile is affected less and elongation drops lower.

★ ★ ★

The specimens exposed as jackets on wire did not lose as much elongation or tensile strength in the weatherometer as they did in the oven. Least loss of elongation resulted from bomb aging. There was an appreciable increase in tensile strength on all specimens after 1000 hours in the weatherometer, but from 2000 hours on the values did not vary appreciably from original values.

★ ★ ★

The type W neoprene jackets lost more tensile strength and less elongation in both the weatherometer and oven tests than the GN-A neoprene jacket. Except for a slightly lower loss of elongation in the weatherometer, the change in tensile properties of the GR-S was not significantly different from that of the neoprenes.

★ ★ ★

As stated above, it was hoped that the weatherometer would show the effect on weathering of lowering the neoprene content of a jacket. Comparing the results obtained on stocks No. 3 with those obtained on No. 5 or those obtained on No. 11 with those obtained on No. 12 there are no differences significant enough to permit a definite conclusion. No. 5 and No. 12 each contained at least 40 parts of whiting in addition to the black and clay loadings common to all.

★ ★ ★

With respect to duplicating the surface degradation found on one sample returned from the field, no evidence of similar degradation was seen even after 8000 hours in the weatherometer. A description of the specimens of jacketed wire after 8000 hours follows:

Straight pieces:

#23, Two of five pieces show longitudinal cracks visible under a 5X glass.

#24, No change.

#25, One out of five pieces shows longitudinal cracks visible under a 5X glass.

#26, Longitudinal cracks visible to the naked eye on five specimens.

Coils:

#23, Alligatoring visible to the naked eye on two out of five coils. No surface change visible on backs of coils which were exposed to indirect light.

#24, Alligatoring visible only under a 5X glass on topmost coil. No surface change visible on rear portion of coil.

#26, Cracking visible to the naked eye on both exposed and rear sides of coil. More pronounced on exposed side. These cracks appear to be ozone cracks.

★ ★ ★

No evidence of brittle surface was seen on any of the samples. Under a 5X glass the surface appeared to be resilient and not brittle when pressed with a pointed instrument.

★ ★ ★

On the basis of the work done here, it appears that a weatherometer such as the one used does not contribute materially to the estimation of expected outdoor service life of neoprene jackets. An accelerated ozone test such as that described by Crabtree and Kemp (2) in conjunction with a 100°C air oven test will, in our judgment, give a reliable criterion of expected service life in a comparatively short time, certainly much shorter than that required for the weatherometer test. In the case of GR-S jackets, however, the weatherometer may be much more useful. Stock No. 26 survived a prolonged accelerated ozone test and has shown no cracking in Los Angeles in two years. It did show severe cracking in fifteen months in Yuma, Arizona, and the indications are that it is beginning to crack in Los Angeles. The appearance of this sample after 2000 hours in the weatherometer would predict this behavior in the field.

★ ★ ★

The authors are indebted to **B. S. Biggs** for helpful suggestions, to **E. L. Dias** and **G. H. Bebbington** for preparation of samples,

(*Please turn to page* 457)

COMPLETE, CONTINUOUS WIRE INSULATING SYSTEMS

for

PLASTIC JACKETING
WIRE ENAMELING
CABLE LACQUERING
GLASS and VARNISH INSULATING

FRICTION LETOFFS
DRIVEN LETOFFS
TENSION CONTROL STANDS
CAPSTANS
CONTINUOUS WINDUPS
STRAIGHT AND RETURN-BEND COOLING TROUGHS
CONVECTION AND RADIANT HEATED TOWERS
SYSTEM DRIVES

Write for descriptive literature, specifications, and complete detailed information.

INDUSTRIAL OVENS, INC.
13807 TRISKETT ROAD CLEVELAND 11, OHIO

Weight of Rectangular Magnet Wires

by C. V. Burns
Medium Induction Motor Department
General Electric Company
Schenectady, New York

This is one of a series of nomographs offered to Wire and Wire Products on an exclusive basis. Others will follow shortly as furnished by the author.

These nomograms are intended to facilitate the rapid determination of some of the physical characteristics of rectangular bare or film coated magnet wire. Scales 1, 2 and 3 yield the weight of wire per 1000 feet for any width-thickness combination within the size range of conventional enamelling equipment (ie, 50 to 190 mils thickness by 50 to 500 mils width). Scales 3, 4 and 5 permit, in addition, the determination of machine productive capacity (for a single strand) in two steps. The advantages of this type of data presentation are obvious, considering the extremely large number of possible width-thickness combinations. Scales are shown on the chart on the following page.

★ ★ ★

Scales 1, 2 and 3 represent a solution to the equation

$$w = 12\ WTp \times 10^{-3} - 10300\ R^2p,$$

where
W = wire width, mils,
w = pound per 1000 feet,
T = wire thickness, mils,
p = specific weight, lb/cu. in., and
R = corner radius.

★ ★ ★

The term $10300\ R^2p$ is a correction for the departure of the rectangular wire cross section from a true rectangle.

★ ★ ★

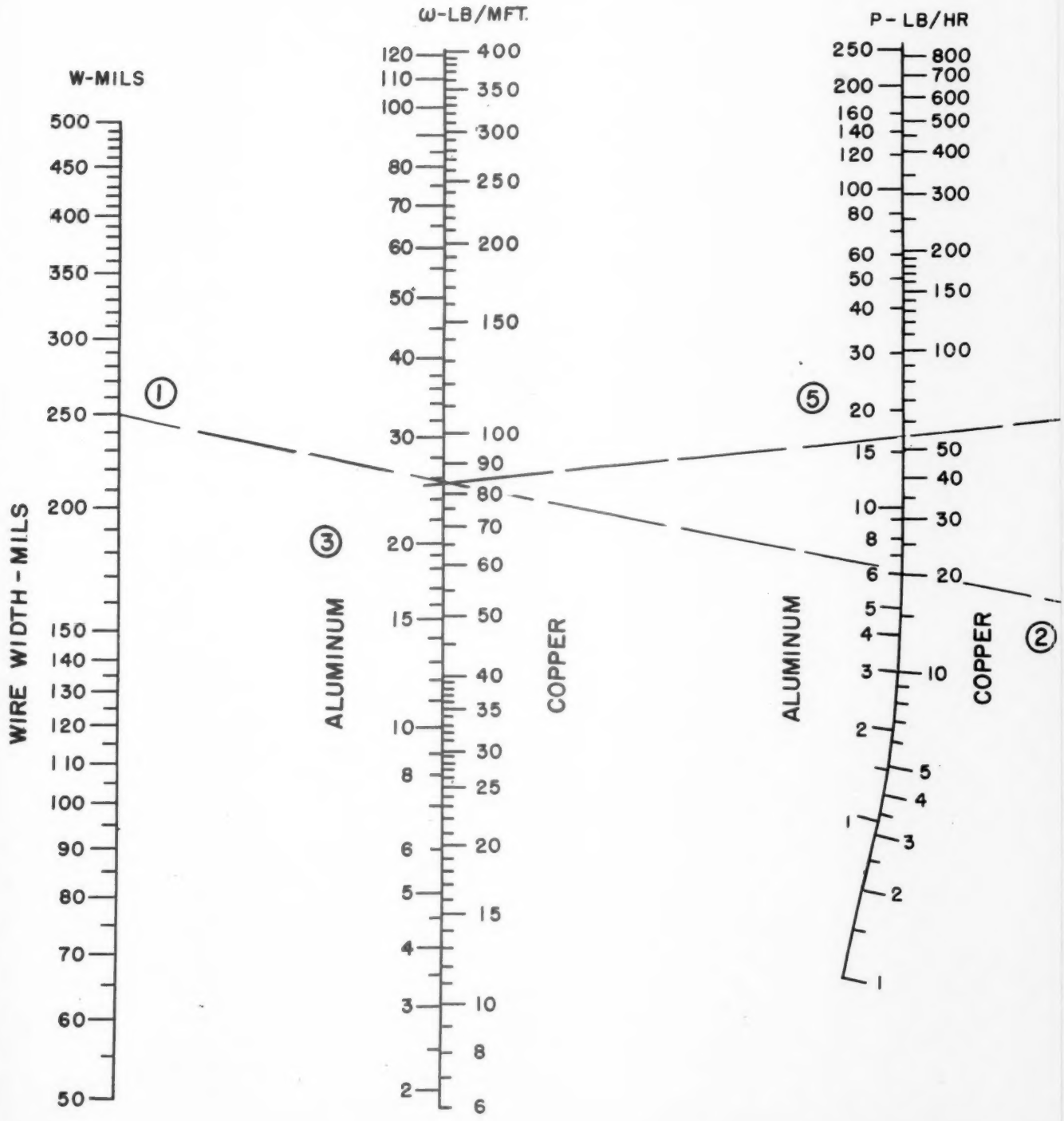
Scales 3, 4 and 5 represent a solution to the equation

$$P = .060\ wS,$$

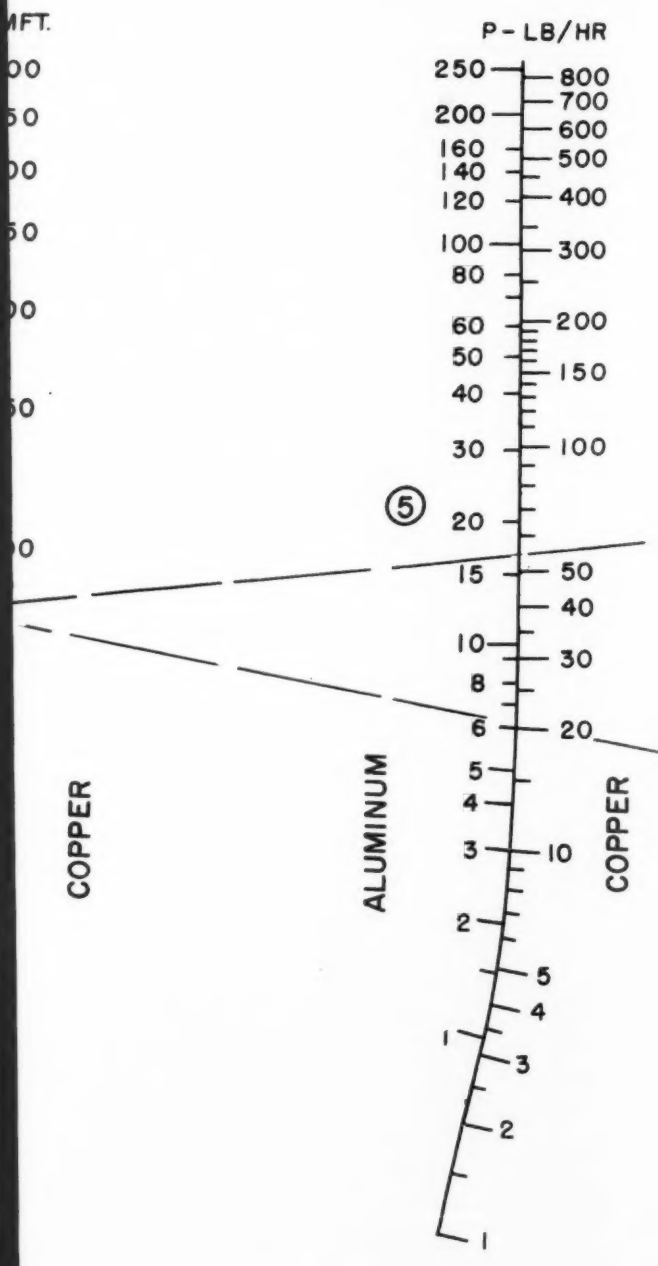
where
P = pounds per hour, and
S = wire speed, fpm.

NOMOGRAPH ON WEIGHT OF RECTANGULAR MAGNET WIRES

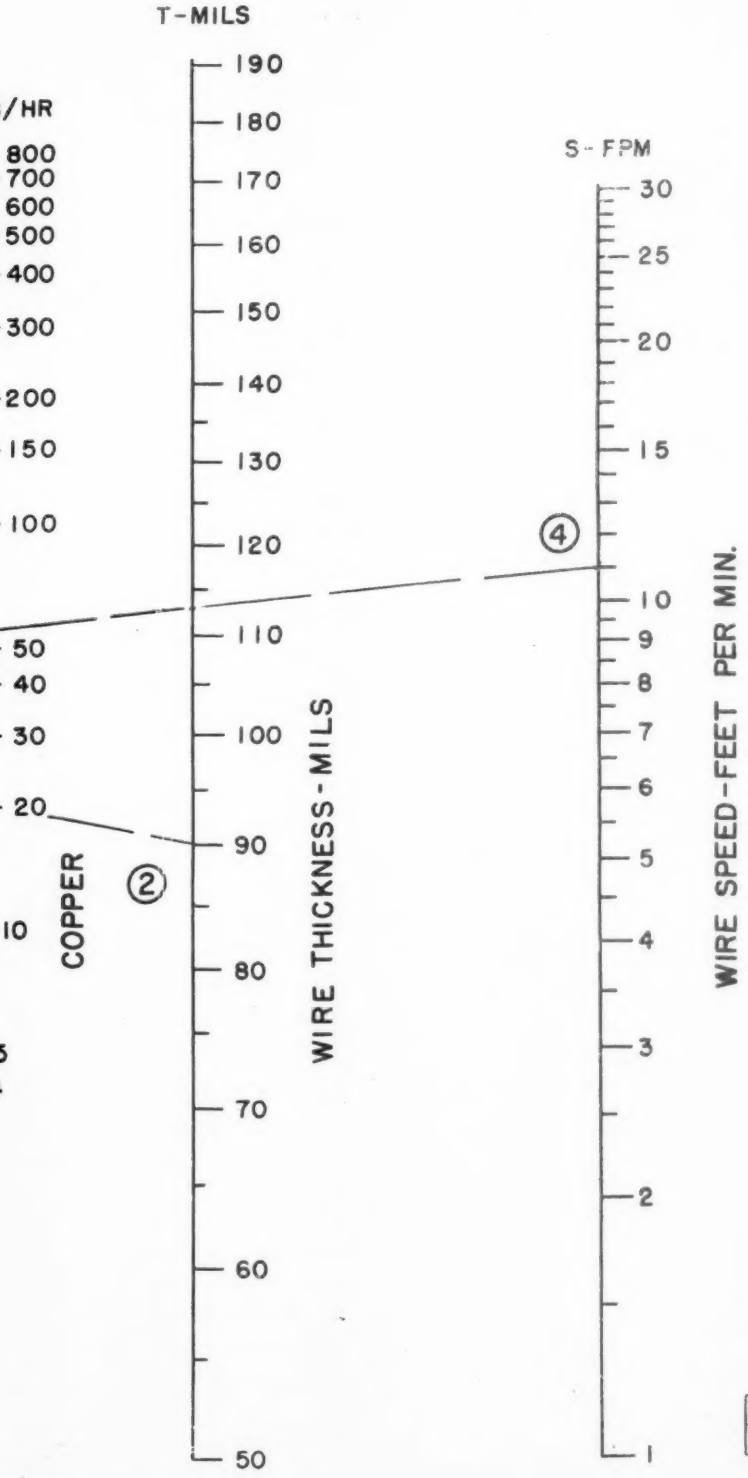
NOMOGRAPH ON WEIGHT OF RE



OMOGRAPH ON WEIGHT OF



OF RECTANGULAR MAGNET WIRES



WEIGHT OF RECTANGULAR WIRES

WIRE MILL PRODUCTS

WIRE WEIGHT
SCALES ① ② & ③ –
$\omega = 12\ WT\rho \times 10^{-3} - 10300\ R^2\rho$ LB/M FEET
W & T EXPRESSED IN MILS
ρ = 0.321 LB/CU. IN. (COPPER)
= 0.09765 LB/CU. IN. (ALUMINUM)
R = 1/32 IN. CORNER RADIUS

WIRE PRODUCTION
SCALES ③ ④ & ⑤ –
P = 0.060WS LB/HR
S = WIRE SPEED, FT/MIN.

CAUTION:
USE RIGHT HAND SIDE OF SCALES ③ & ⑤ FOR COPPER.
USE LEFT HAND SIDE OF SCALES ③ & ⑤ FOR ALUMINUM.

REVISIONS
1. 9-18-56 ADDED SCALES NO. 4 & NO. 5.
2. 10-15-56 REDRAWN & ADDED ALUMINUM SCALES

Roy Nielsen Oct 23, 1956
C.V. Barnes 10/24/56

MED. IND. MOTOR
SCHENECTADY

Government Wire Production Information

Foreign Trade Statistics Notes

Prepared under the supervision of **J. Edward Ely,** Chief, Foreign Trade Division; **William C. George,** Assistant Chief; **Audrey Ratchford,** Export Statistics, **Dino S. Villa,** Import Statistics; **Milton Kaufman,** Shipping and Foreign Aid Statistics.

* * *

Work is being initiated immediately on the long-postponed project to incorporate revisions in the commodity classifications provided for export statistics in Schedule B, **Statistical Classification of Domestic and Foreign Commodities Exported from the United States.** If possible, the revised and reprinted Schedule will be made effective January 1, 1958. All requests for revisions now pending in the Census Bureau will be reviewed and considered for incorporation. Any additional requests for changes in commodity classifications received by March 1, 1957 will also be considered.

* * *

It is not planned that there will be an over-all expansion in the number of classifications in Schedule B, and as a matter of fact the Bureau of the Census plans to propose combinations of a substantial number of Schedule B classifications. These consolidations will be proposed principally in areas where the volume of exports is low, and particularly where little or no interest was indicated when combinations were made under Schedule G, in effect during January-June 1956 (January 1956 **Notes).** However, it is recognized that changes in the pattern of trade make expansion of the number of classifications desirable in some commodity areas, and requests for such expansion can be considered where justified by the volume of trade. Users are requested to ask for expansion only where an urgent need exists for separate statistics. Users are also encouraged to suggest combinations of classifications where more detail is now being shown in export statistics than appears to be useful.

* * *

Industry Advisory Committees such as those which took an active part in the 1952 revision of Schedule B are being reactivated for this revision. These Committees were established by the Advisory Council on Federal Reports, which was set up in 1942 by industry representatives at the request of the Bureau of the Budget to provide advice to that Bureau on questionnaires and reporting procedures of Federal Agencies. The Government Interdepartmental Advisory Committee on Foreign Trade Commodity Classification will also take part in this revision of Schedule B. Requests for revisions in commodity classification may be sent to the Foreign Trade Division, Bureau of the Census. However, requests from industry may be sent to the Chairman of the appropriate Industry Advisory Committee, if desired, and requests

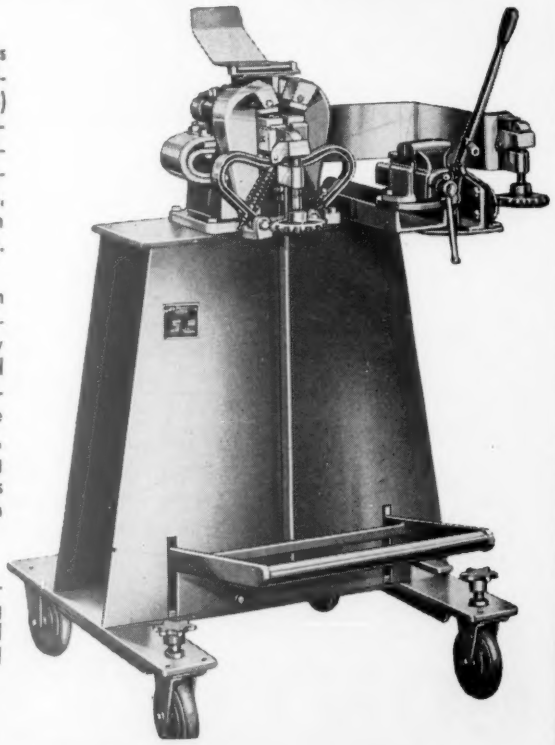
MODEL "J"
TYPE AUTOMATIC
MICRO-WELD BUTT WELDER

MICROMETER PRECISION — MICRO-WELD — TRADE MARK REGISTERED

This type welder is available in four Models (J-45-C) (J-5-C) (J-7-C)(J-8-C) for welding COPPER, ALUMINUM, and other nonferrous wire and rods, ranging in size from .080" to ½" diameter.

The welding cycle on these units is automatically completed by one single downward stroke of the foot pedal, which clamps the stock being welded, contacts the welding switch, and supplies the upset pressure on the weld.

All welders are equipped with annealing dies, filing vise, hand shears, and mounted on a 4-wheel truck.



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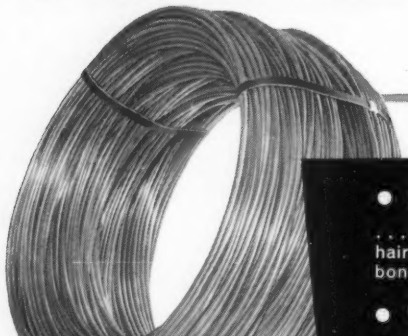
Telephone, State 2-7468

WIRE

BACKED BY A HALF CENTURY OF EXPERIENCE



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. . . down to almost the size of a human hair, in low carbon and medium low carbon steels.

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the right wire for the job—coppered, tinned, bright, galvanized and other finishes to fit your production needs.

- **Better forming and workability**

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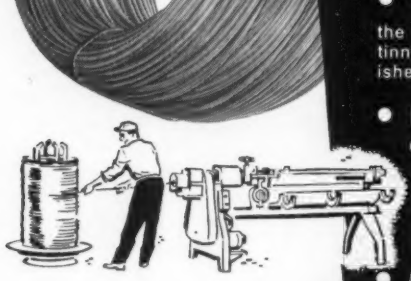

ECONO-COIL—Reduces scrap loss up to 90 percent. Saves material handling time. The Econo-Coil gives you continuous length wire coils of 2000# to 3000# catchweight, in sizes from 12 gage through ½" diameter. Shipped on returnable Econo-Coil pallets.

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from governmental agencies may be routed through the Chairman of the appropriate Government Advisory Committee. Lists of the committees and a background explanation about them are shown in the Introduction to Schedule B. Committee membership is now being reviewed and up-to-date lists will be carried in a future issue of the **Notes.**

★ ★ ★

It is emphasized that requests should be submitted as promptly as possible so that the work of reviewing them can begin. Tight deadlines will have to be observed in order to make the revised edition effective January 1, 1958, and requests should definitely be submitted by March 1, 1957. With this schedule it is anticipated that the January 1958 effective date can be met. Meeting this effective date is, of course, contingent on sufficient funds being available in fiscal 1958 to complete the work which will remain to be done after the end of June 1957.

ABSTRACTS

These abstracts are published through the courtesy and with the permission of the Industrial Diamond Information Bureau, 34 Holborn Viaduct, London, E.C.1, England. Inquiries regarding them should be directed to the Bureau.

THE INFLUENCE OF ALLOYING ELEMENTS ON THE CHARACTERISTICS OF STEEL WIRE QUENCHED IN LEAD

Hutnik Pols. XXII, No. 9 (1955), 306-313

The effect of C, Mn, Si, S, P, Cr, Ni, Cu, Al, N is considered. In summary, amongst the various elements present in steel, it is Cr which has the most unfavorable influence on the isothermal transformation of asutenite on quenching in lead. The other elements do not have an unfavorable influence when present in the usual amounts. The study was made on individual elements without considering the effect on each other. TTT curves change considerably even when small amounts of different elements are present and act on each other.

ELECTRO-EROSION — ITS APPLICATION TO WIRE DRAWING DIES

Wickman Ltd. Wire Prodn 1956 Vol 5 (12) pp 5, 7, 9, 11, 13 (Nov)

Various applications described, including opening up of wire drawing dies. 8 illustr.

TEMPERATURE MEASUREMENTS IN THE DRAWING OF STEEL WIRE. I. Temperaturmessungen beim Ziehen

von Stahldraht W. Lueg, K. H. Treptow. Stahl & Eisen 1956 Vol 76 (25) pp 1690-1698 (Dec 13) (In German)

Lecture to VDEh, June 22, 1956, Duesseldorf. Rep No 69 of comm for wire working.

Experiments with and comparison of 3 different methods of measuring temp during wire drawing; (a) wire and sintered carbide core of die form hot junction of thermocouple—good repeatability; suitable for measurements in production; shows up effects of alterations in drawing conditions. (b) split die forms thermocouple — results independent of lubrication but method obviously inapplicable to production. (c) Temp gauge in which thermocouple heated by radiation from drawn wire—difficult to calibrate; results depend on dia of wire and drawing speed. 12 illustr, 27 ref, 2 tables.

TESTING OF ROLLING OIL EMULSIONS BY WIRE DRAWING. Pruefung von Walzoel-Emulsionen im Drahtziehversuch

W. Lueg, W. Dahl. Stahl & Eisen 1956 Vol 76 (25) pp 1169-1671 (Dec 13) (In-German)

Lecture given at subcommittee on rolling methods, Dec 7, 1956, Duesseldorf. Rep No. 34 of cold rolling committee of Verein Deutscher Eisenhuettenleute.

Soft and hard steel wire drawn with various rolling oil emulsions as lubricants; comparison of drawing force and temp. Agreement with rolling tests unsatisfactory. 5 illustr, 1 table.

MACHINES FOR THE POLISHING OF DRAWING DIES. Maschinen fuer die Ziehsteinbearbeitung

Ziegfried Eder, Vienna-Oberlaa. Draht 1956 Vol 7 (12) p 488 (Dec) (In German)

Description of universal grinding and polishing machine for diamond or carbide dies. 2 illustr.

DETERMINATION OF THE STRAND STRUCTURE OF WIRES. Zur Ermittlung der Fasertextur von Draehten mit einem Zaehlrohrgoniometer

F. Haessner. Zeits Metallkde 1956 Vol 47 (9) pp 649-652; Zerstoerungsfreie Materialpruefung 1956 (10) No. 0276

Description of goniometer-counter for determination of strand structure of wires. Recorded diagrams and comparison of texture of hard drawn and recrystallized aluminum wire.

METHODS OF PREPARING WIRE-DRAWING DIES

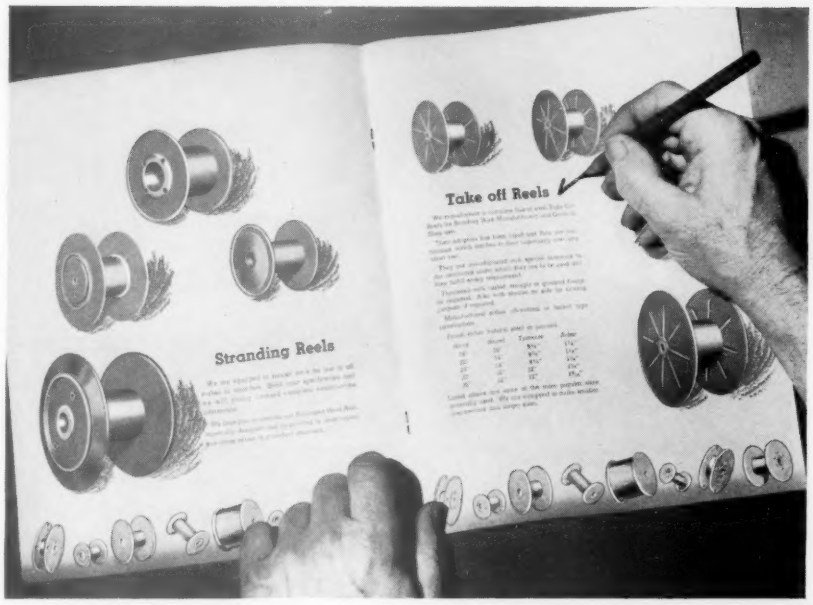
I. I. Voronov. Metallurg 1956 (6) p 36; DSIR Transl Contents Lists Russ Period 1957 (94) p 88 (Jan) (Original in Russian)

BP 756,160 NV WALLRAMIT HARDMETAAL MAATSCHAPPIJ DRAWING DIES

Abstr Wire Ind 1956 Vol 23 (276) p 1118 (Dec.)

Drawing die designed to facilitate releasing of jaws with view to die readjustment is also intended to ensure that jaws remain in contact with their supporting faces in frame and consequently remain supported across entire surface area of these faces during operation.

When you need the right reel . . .



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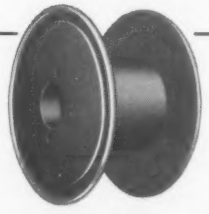
Backed by more than fifty years experience and modern, high-speed production facilities, Apco Mossberg Engineers are ready at all times to meet your exact specifications for custom-made reels, spools, and bobbins in all sizes and designs. Their first-hand knowledge of wire and wire rope handling requirements enables them to make sound practical recommendations that often result in substantial savings for you. Try them and see!

Send us your specifications or call direct for preliminary recommendations at no obligation.



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Announces New Coil Wrapping Machine

The Terkelsen Machine Co., 326 A Street, Boston 10, Mass., has announced a new and improved coil wrapping machine, Model 4-57, said to embody many important improvements in both design and operation.

* * *

This model wraps wire coils of 17" to 30" outside diameter, a minimum inside diameter of 10" and a cross sectional diameter up to 10". It can be made to order to accommodate larger coil capacities, if desired.

* * *

Some of the features of the 4-57 wrapping machine are a positive V-belt drive, higher speed (said to be the highest of any machine made), a tight and uniform wrap on any size coil and the use of ball bearings throughout for quiet, smooth operation and long life.

* * *

The company, which has a line of 20 standard machines for wrapping coils on straight lengths, will be glad to furnish full information on wrapping machines for any need.

New Herborn Catalogue

The Herborn Maschinenfabrik announces the issue of a new catalogue illustrating some of the wire drawing equipment manufactured by this well-known firm. For copies of this very interesting catalogue, address Herborn's U. S. representatives, **Kurt Orban Company, Inc.,** 34 Exchange Place, Jersey City 2, N. J., Wire Machinery Division, Attention **Robert H. Geiss.**

New Brochure Describes Latest Screw and Rivet Headers

Both the 3/16" and 5/16" Waterbury Farrel "Hi-Pro" solid-die, double-stroke crank headers for cold heading screw and rivet blanks are described in detail in this 8½" x 11", two-color brochure. Features responsible for the headers' respective production rates of 225 and 175 screw or rivet blanks per minute in maximum lengths of 1½" and 2⅝" are given.

To assist the reader, the brochure treats each feature separately—the feed, cutoff mechanism, heading unit, knockout drive, lubrication and both WF standard and Phillips type tooling. Pictures show three views and a close-up of the knockout relief mechanism, highly useful in forming shoulders and other formations under blank heads.

★ ★ ★

Two tables containing standard tool sizes and header specifications for both the 3/16″ and 5/16″ headers complete the brochure.

★ ★ ★

Free copies of the new "Hi-Pro" brochure are available from **The Waterbury Farrel Foundry & Machine Co.**, Waterbury, Conn.

Herborn Wire Drawing Machines

A great deal of interest has been aroused in the American wire industry in the design and performance of the "Herborn" wire drawing equipment. A battery of twelve machines is scheduled for delivery in the USA by the end of April, and a second battery of 6 machines will follow by the end of May, 1957. "Herborn" machines are unique in design, sturdy in construction and remarkably trouble-free in performance.

★ ★ ★

Contact Kurt Orban Company, Inc., 34 Exchange Place, Jersey City 2, N. J., Attention **Robert H. Geiss**, Wire Machinery Division, for information.

New Paper Lapping Machine for Super Tension Electric Cables

To meet the need for precision paper lapping, B. & F. Carter & Co. Ltd., Waterloo Street, Bolton, have developed a machine which they feel will meet the most exacting demands as far as the paper lapping of electric cables is concerned. The machine is capable of dealing with oil impregnated or dry papers up to 18″ diameter x 1½″ wide on 6″ bore cardboard centres and capable of attaining a

EFFICIENT, MODERN SYSTEMS

FOR

ELECTRICAL WIRE & CABLE MANUFACTURING

• *CABLE LACQUERING SYSTEMS*

Conventional cellulosic, or other type, lacquers are applied in successive continuous coats from one to twenty-eight coats over fibrous braid wrapped primary conductors. One end, four ends, or eight ends of wire are handled continuously. System includes letoff, application, drying and constant tension takeup equipment.

• *WIRE ENAMELING SYSTEMS*

Natural and synthetic enamels, silicones, solution nylon, modified plastisol, and similar insulating coatings are applied to bare, cotton or glass covered wire in round, square or rectangular cross section. Ten or twenty simultaneous strands are handled. Systems are complete with letoff, preannealer, application system, capstan and multiple takeup unit.

• *ASBESTOS INSULATING SYSTEMS*

Carded asbestos is applied to continuous single conductor as an integrated operation with saturating, rotary forming, drying, cooling and polishing of the finished wire. Wire from No. 20 gauge to No. 6 AWG is handled through an asbestos wall thickness range of from .008″ to .040″ thickness in a single pass.

• *RUBBER OR PLASTIC JACKETING SYSTEMS*

Rubber and thermoplastic jacketing compounds are continuously applied to electrical wire or cable by the extrusion method. High speed, constant tension letoff and takeup equipment, controlled cooling or continuous vulcanizing equipment are powered by synchronized range drives as complete, integrated wire handling systems. Extrusion machines of customer's choice are furnished.

• *GLASS & VARNISH COATING SYSTEMS*

Double layer of glass or cotton wrapping is applied to round, flat or square conductor. Two individual coatings of high temperature varnish are applied and the finish baked in a continuous operation. Units are complete from letoffs to takeup frames.

• *SELF TRAVERSING REEL CORD DRYERS*

These ingenious machines are used to remove hygroscopic moisture from fibers, braided or knitted flexible cable. These machines increase extrusion speeds, reduce blister scrap loss and improve diameter control. They are easily installed in existing extrusion line.

TECHNICAL INFORMATION ON ANY OF THESE PROCESSES UPON REQUEST

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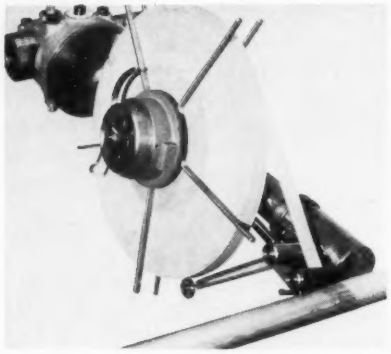
speed up to 300 revolutions per minute with only the slightest of variation in tension on the paper. The illustration is a close up of a single head, showing all the details of adjustment and the general robust construction. It will be particularly noticed that the paper is controlled right up to the lapping point eliminating the possibility of crinkle, etc.



Single Paper Taping Head. * * * * *

These heads can be mounted with eight, ten or twelve units per cage as required. Each head can be adjusted longitudinally by rack and pinion to an exact setting registered by inset steel rules in the steel tubes upon which they are mounted. Angular setting of the pads is effected by worm and wormwheel and the angle is registered precisely on an engraved protractor. These adjustments are made by use of a key on two square ended studs whilst the same key used on a third stud locks each head for both angular and longitudinal setting. The fitment enclosing these devices is cast in high tensile alloy for lightness.

* * *

The tension on the paper tape remains constant throughout the life of the pad. This is done by a central split cone in the centre of the pad controlled by roller arm bearing on the surface of the pad itself.

* * *

Each head has a built-in paper tension indicator so that the preset tension is visible on a scale. Should this tension be lost for some reason, an electrically operated device stops the machine.

Fresh paper pads can be loaded quickly and simply, the retaining collar being spun on and locked in one movement by the locking handle shown. The wire safety clip is thrown outwards by centrifugal force so that it is impossible for the collar to be completely released while the head is lapping.

★ ★ ★

The paper passes from the pad over a polished stainless steel roller mounted on needle bearings. This roller applies the paper tangentially to the cable and can be adjusted to the correct position by a key, rack and pinion. This adjustment is suitable for any cable up to 3" diameter and is set to a scale. By this method the paper is rolled on to the cable dispensing with the necessity for using dies and reducing windage to negligible proportions.

★ ★ ★

If it is desired to change from right to left hand paper application, it is only necessary to reverse the spring fulcrum bracket secured by two socket screws. Paper tensions are available from 2 lbs. to 8 lbs., or higher, if necessary.

★ ★ ★

The centre of the cages containing 12 heads each with 18" diameter pad is 6' x 6'4" overall width. The points of adjustment, band rapid reloading device of the pads are easily accessible to the operator.

T.C.I. to Produce Welded Fabrics

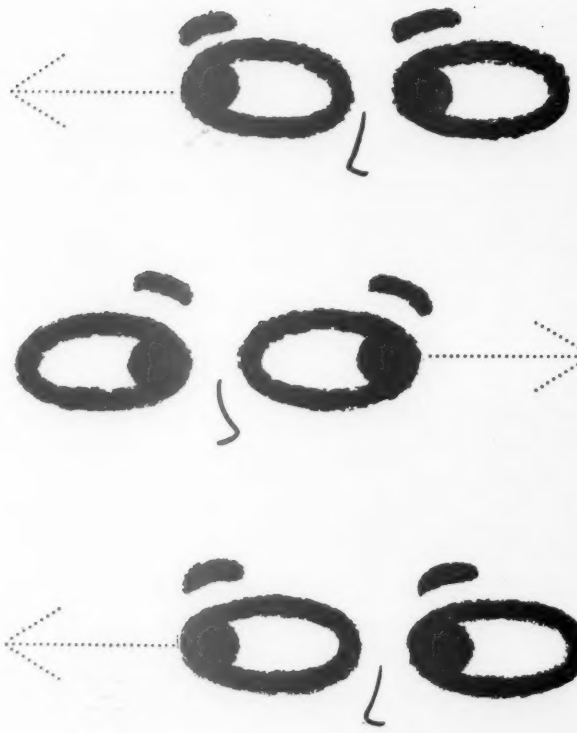
Facilities for the production of welded wire mesh are being installed at **United States Steel's Tennessee Coal & Iron Division,** Birmingham, Ala., it was announced by **Arthur V. Wiebel,** T.C.I. president.

★ ★ ★

Equipment being installed includes two 156-inch fabric welding machines, together with auxiliary equipment. Housing for production facilities and storage will be provided in the division's Fairfield Wire Works.

★ ★ ★

Of the electric welding type, the machines will have a combined annual capacity of almost 18,000



Alternating stresses bear watching!

Back and forth . . . up and down . . . in and out . . . if those stresses keep changing, the life of a metal part is a hard one . . . and often a short one. Stress reversals can cause "fatigue" failure at stresses far below the expected strength of the metal. One of the outstanding properties of phosphor bronze is its high resistance to fatigue failure. It is widely used for electrical switch parts, relay contact springs, bellows, rotating shafts and other moving or vibrating parts.

For detailed information on phosphor bronze, write to Riverside-Alloy Metal Division, H. K. Porter Company, Inc., Riverside, N. J.

ALLOY METAL WIRE Prospect Park, Pa. | RIVERSIDE METAL Riverside, N.J. | PRENTISS WIRE MILLS Holyoke, Mass.

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Unnoticed by most . . . taken for granted by those who live by its warnings, the searchlight signal of cTc — Centralized Traffic Control — stands guard on railways stretching from coast to coast. In bustling terminals . . . at lonely prairie crossroads, Seymour "PHOSPHOR BRONZE" helps these unfailing sentinels flash the stop and go messages which control our rail-borne commerce. Contact springs, connectors and other parts of their electric nerve system are formed from this corrosion-resistant, even-tempered, long-lived and reliable metal.

Seymour "PHOSPHOR BRONZE" — identified by its *Elephant Brand* — is a basic material in unnumbered applications where the strength, beauty and versatility of the finest bronze is a special requirement.

Want more information about cTc and Seymour "PHOSPHOR BRONZE"? Just write . . .

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tons. They will furnish wire mesh for such construction uses as various forms of concrete construction, including highway paving, airport runways, buildings, pipe and the like. The fabric will be produced in various widths, in cut-to-length sheets or coils.

Moves Into New Warehouse on Coast

Firth Sterling Inc., manufacturer of tool and die steel, sintered carbides, high temperature alloys and zirconium, announces the opening of a new warehouse at 2900 S. Vail Avenue, Los Angeles, Cal.

★ ★ ★

Firth Sterling's general offices are located in Pittsburgh, Pa., with manufacturing facilities in McKeesport, Pa.; Trafford, Pa.; Hartford, Conn.; Houston, Texas, and Detroit, Mich.

Acknowledgement

Frank R. Nichols, President of the **Nichols Wire and Aluminum Co.,** Davenport, Iowa, has written that in his paper "The Progress of the Properzi Process," delivered at the Annual Convention last October and published in Wire and Wire Products, he neglected to give proper credit for an important development referred to in his paper.

★ ★ ★

This was the method of submerging the tip of the spout in the receiving pool of molten metal within the casting wheel of the Properzi Casting Machine. The new technique was one developed by the engineering personnel at Pechiney's plant at St. Jeanne de Maurienne in France.

★ ★ ★

Mr. Nichols regrets this omission of proper credit for the modification of the original Properzi Process that has made possible the casting of a rod of larger cross-section and provided better casting control. We are happy to lend our columns to the correction of this omission and hereby publish a due acknowledgement of this contribution to the efficiency of the machine on the part of the Pechiney engineers.

Outstanding Personalities of the Wire Industry

Elected to Firth Sterling Board

Dr. Paul F. Genachte, Director of the Atomic Energy Division, Chase Manhattan Bank, has been elected to the Board of Directors of **Firth Sterling, Inc.** He was born in Belgium, getting his Bachelor of Science Degree from Brussels University in 1932, receiving his Master of Science Degree from the Massachusetts Institute of Technology in 1933 and, the following year, a Ph.D. Degree from the California Institute of Technology.

Norton Appoints Steel Service Manager

Stephen Smith has been appointed Manager of the Sales Service Department by Norton Company, Worcester. He was formerly supervisor of the sales department. In this newly created post, he will be responsible for quotations and special pricing, special packaging, complaint adjustments, warehouse liaison and stock control and special sales statistical studies. His appointment was announced by **Donald L. Price,** Sales Manager of Grinding Wheels for the Abrasive Division.

★ ★ ★

Mr. Smith has been with Norton since 1946. After three years in staff and control work, he joined the sales department. In 1951, he was appointed supervisor. He graduated from Harvard College with a degree in electrical engineering and later did graduate work in business administration at the University of Wisconsin.

Nopco Names Four New Officers

The Board of Directors of the **Nopco Chemical Company,** Harrison, N. J., has elected four new company officers. Election of the new officers was announced by **Ralph Wechsler,** President of Nopco.

★ ★ ★

George H. Faux, formerly Nopco's Secretary, becomes the new Treasurer. He fills the post vacated by **Albert A. Vetter** who recently retired after 38 years with the company.

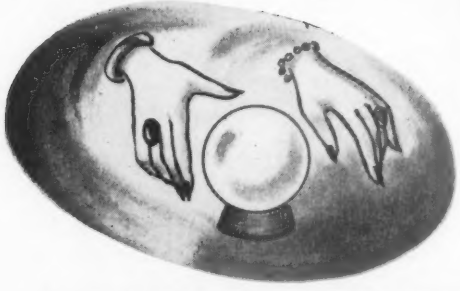
★ ★ ★

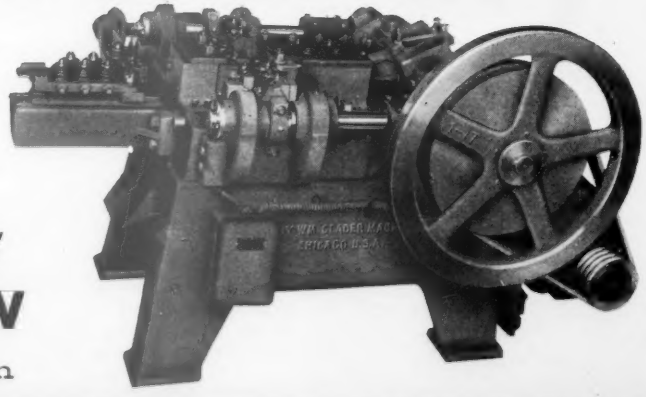
Alfred O. Brookes, formerly Assistant Secretary, becomes new Secretary. **Robert M. Urich,** formerly Budget Director, becomes Assistant Treasurer. **Julius J. Denzler,** head of Nopco's Legal Department, becomes Assistant Secretary.

★ ★ ★

Nopco, celebrating its 50th anniversary this year, is a basic producer of industrial processing chemicals.

IF THERE'S A NAIL MACHINE IN YOUR *Future* make it a GLADER





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To Manage Silicone Sales for G.E. in Cleveland

K. Jerry Morray has been appointed manager of the Cleveland Sales District of the **Silicone Products Dept., General Electric Co.** by **J. T. Coe,** department sales manager. Mr. Morray began his new assignment on February 25th. He joined G. E. in 1949 and his most recent General Electric assignment has been as a sales and product planning specialist in the Chemical Materials Department, Pittsfield, Mass.

★ ★ ★

Mr. Morray graduated from the University of Illinois with a B. S. degree in Chemistry. Before joining General Electric, he served as a development chemist with the U. S. Rubber Company and as a technical sales representative of the Barrett Division, Allied Chemical and Dye Corp.

NORBIDE* Abrasive Grain...

Ready to cut Your Refinishing Costs!

Wire men who have switched from costly diamond dust to NORBIDE Abrasive for refinishing dies are amazed at the savings. They have found NORBIDE Abrasive — the hardest manufactured abrasive commercially available—ideal for ripping and semi-finishing operations. Whatever your requirements, we can supply you promptly from stock.

For details and prices on this cost-cutting abrasive, write for form 559, NORTON COMPANY, 45 New Bond St., Worcester 6, Mass.

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Making better products... to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories. BEHR-MANNING PRODUCTS: Coated Abrasives Sharpening Stones • Behr-cat Tapes
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NORBIDE* | *The hardest manufactured abrasive commercially available!*

New Manager for Associated Spring's Ann Arbor Plant

Oscar L. Joseph, who has been purchasing agent of the Plymouth plant for the past two years, has been named plant manager of the Ann Arbor plant of **Associated Spring Corporation's Barnes-Gibson-Raymond** division, effective March 1st, according to an announcement by **Charles J. Stofko,** general manager of the B-G-R division.

★ ★ ★

Mr. Joseph succeeds **Melvin E. Donally,** who retires March 1st after 50 years with the company and its predecessor, the **Cook Spring Company.**

Waterbury Farrel Elects Treasurer

A. D. Mitchell, President of **The Waterbury Farrel Foundry & Machine Co.,** Waterbury, announced that he resigned as Treasurer of the Company on December 31, 1956 and that **Arthur D. Patterson** has been elected to that office effective as of January 1, 1957.

★ ★ ★

Prior to coming with Waterbury Farrel, Mr. Patterson was Financial Vice President of **Pressed Metals of America, Inc.,** of Port Huron, Mich. Prior to that time he was Executive Vice President of Follansbee Metals Corp. which maintained steel warehousing plants in Pittsburgh, Pa., Rochester, N. Y., and Wallingford, Conn.

Appointed Manager of Three L. A. Young Plants

The appointment of **Don Cannon** as manager of the three Chicago plants of **L. A. Young Spring & Wire Corp.** has been announced.

★ ★ ★

The plants manufacture automobile seat cushion and back assemblies, integral seat frames, tubular seat frames and wire garment hangers.

Mr. Cannon has been assistant comptroller of the corporation and assistant to **Russell B. Robins,** vice president of marketing. Previously he was supervisor of cost accounting.

Firth Sterling Promotes Hager

Firth Sterling Inc. announces the appointment of **Herbert H. Hager** as General Superintendent, Steel Production.

★ ★ ★

He joined the Steel Division of Firth Sterling in 1937. Prior to his present position, he was Superintendent of Production Planning in the Steel Division.

★ ★ ★

Thomas E. Landy, formerly Assistant Supervisor of Steel Production, replaces Mr. Hager as Superintendent of Production Planning. Mr. Landy has been with Firth Sterling's Steel Division more than ten year.

GE's Chemical Dept. Appoints Engineer

Appointment of **John F. Blumenfeld** to the post of development engineer at **General Electric Company's Chemical Development Dept.** has been announced by Process Development section manager **George E. McCullough.**

★ ★ ★

Mr. Blumenfeld, a native of Madison, Wisconsin, is a graduate of the University of Wisconsin, where he received both his B. S. and M. S. degrees in Chemical Engineering. He joined General Electric's Chemical and Metallurgical Program in 1949 and took his first post at Pittsfield in 1950 as a chemical engineer in the Process Development Dept. Subsequent assignments have been at Schenectady, N. Y., where he served as a development engineer in General Electric's Knolls Atomic Power Laboratory, and with the Alkyd Resin Plant operations as a process engineer.

Andrew Sorensen

The Syncro Machine Company announces with deep regret the passing of its Chief Field Engineer, **Andrew Sorensen,** at Port Huron, Michigan, on February 8, 1957.

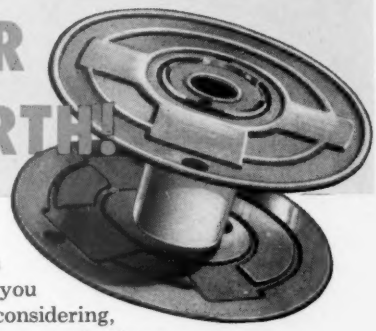
N. L. Hite

N. L. (Beanie) Hite, who retired December 31 as Sales Manager of the Wire Division of **Continental Steel Corporation,** died suddenly on February 13th at the St. Joseph Hospital in Kokomo. Death was due to a rupture of the aorta. Mr. Hite was widely known throughout the steel industry for he had just completed fifty years with Continental Steel, the last eighteen as a sales manager.

Get the habit of reading regularly
WIRE AND WIRE PRODUCTS
The Wire Man's Magazine

If you use lightweight, non-returnable spools

GET ALL YOUR MONEY'S WORTH!



Only Masonware non-returnable spools offer you all these advantages in stock models. Compare the spool you are now using, or the spool you are considering, against this chart. See why Masonware spools give you *more* for your money. Then contact Masonware for full details on Masonware non-returnable spools.

	Masonware Spools	Brand A	Brand B
Lower Cost	✓		✓
Resists Crushing	✓	✓	
New, Lock-tight Construction	✓		
Heavily Tinned Barrel (inert & non-corrosive)	✓		
Light-Weight	✓		✓
Lithographed by Manufacturer	✓	✓	
Long Experience	✓	✓	

Use Masonware lightweight, non-returnable spools for

INSULATED WIRE
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MASONWARE SPOOLS AVAILABLE IN 3¾", 5", 6½", 8½" and 10½" head sizes; 1⅞" standard barrel diam.; 3½" barrel diam. available for 10½" head only; barrel lengths from ⅜" to 14"; special sizes fabricated from your dies.

Let us solve your spool problem! Write, wire or call

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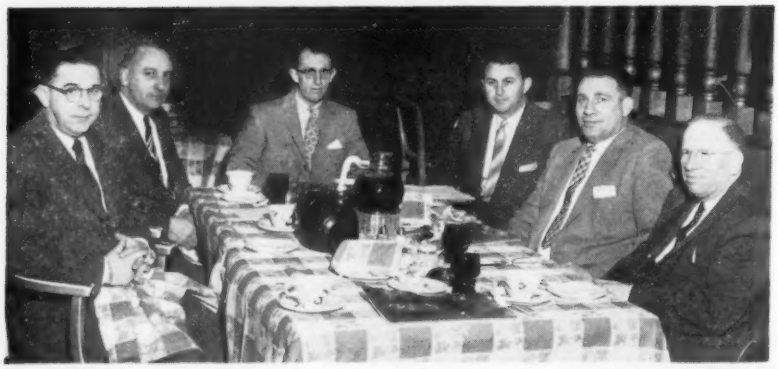
The Program Committee for the Two-Day Pacific Coast Regional Meeting



The planning committee for the 1957 Pacific Coast Regional Meeting of **The Wire Association,** shown above, met recently to discuss agenda for the June 13 and 14 Association Meeting in San Francisco.

* * *

Left to right are: **John S. Hawley,** E. H. Edwards Co.; **A. B. Kreider,** Bethlehem Pacific; **Lloyd W. Albright,** Colorado Fuel & Iron Corp., Oakland; **V. A. Barbata** (Chairman), Bethlehem Pacific; **Wm. Mohr,** Colorado Fuel & Iron, South San Francisco; and **D. W. Hadsell,** Columbia-Geneva Division, U. S. Steel.

* * *

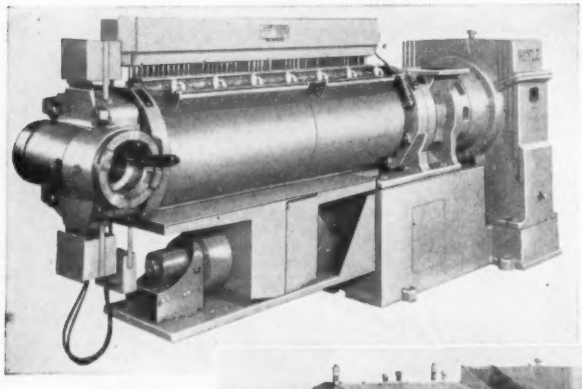
An indication of the importance of this meeting is the fact that it will be a two-day affair instead of only one as heretofore. Two sessions of panel discussions on subjects pertinent to the industry are slated for June 13. On June 14 the wire men are scheduled to visit the Pittsburg, California wire mill of U. S. Steel's Columbia-Geneva Division.

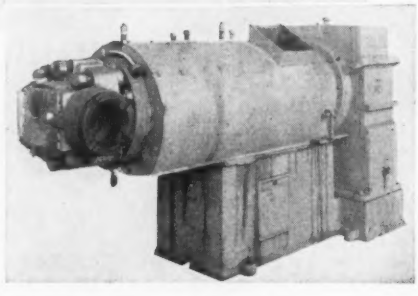
Sales Personnel Changes Announced by Chase Brass

Three major promotions from within the sales department of **Chase Brass & Copper Co.,** Waterbury, a subsidiary of **Kennecott Copper Corp.,** have been announced by **George B. Moseley,** vice president-sales. All changes are effective May 1st.

* * *

Involved are **Leland S. Hanson,** eastern regional sales manager who steps up to the position of executive sales director; **Charles A. Festge,** currently district manager for Chase at Milwaukee, Wis., who will succeed Mr. Hanson; and **Edward J. Finn,** of the general sales department in Waterbury, who will succeed Mr. Festge as district manager at Milwaukee.





8½" Spirod extruder with side delivery head for jacketing. Up-graded from circulating type shown to the right.

EVER THINK OF UP-GRADING TO SPIROD®?

Yes, it can be—and is being—done. And Royle's traditional approach to extruder development, the retention of features that have stood the test of time, makes it possible. The one-piece cylinder with built-in hopper is replaced by a separate cast steel hopper section, a cast steel cylinder with deep grooves that create fin-like separations for the rod type heating elements and the selective evaporative cooling equipment. Head and stock screw, as usual, are designed for process requirements.

If you are operating an older type Royle extruder you should investigate up-grading to Spirod—the electrically heated extruder with high velocity evaporative cooling—for maximum efficiency in controlled operating temperatures.

Write for Bulletin # 463

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Announce New Assignments on NEMA Staff

Roderic D. Smith and Roland L. Nims have been appointed to direct sales promotional and engineering activities of Major Appliance, Electric Housewares, Electric Fan and Commercial Cooking Equipment Sections of the **National Electrical Manufacturers Association,** it was announced today by **Joseph F. Miller,** Managing Director of NEMA. These activities were formerly handled by the late **Leo K. Fox,** who died on November 27th of last year.

★ ★ ★

Both men have been members of the NEMA staff for several years. They will continue as recording secretaries for two of the NEMA subdivisions which they have served in the past as well as act in the same capacity for the additional Sections to which they have been assigned.

★ ★ ★

Mr. Smith will be Recording Secretary, Major Appliance Division, and will continue as recording secretary of the Switchgear Section.

★ ★ ★

Mr. Nims will be Recording Secretary, Electric Housewares, Electric Fan and Commercial Cooking Equipment Sections and will continue as recording secretary of the Motor and Generator Section.

Named to Sales Executive Post by Roebling

Douglas W. Vernon has been named product sales manager for wire rope and aircord by **John A. Roebling's Sons Corporation.** The announcement was made by **Walter A. Huber,** general manager of the Roebling Wire Rope and Aircord Division. Mr. Vernon, formerly vice president and general manager of the **Leschen Wire Rope Division** of the **Watson Stillman Company,** assumed his new duties on February 1st at Roebling's main plant in Trenton, N. J.

★ ★ ★

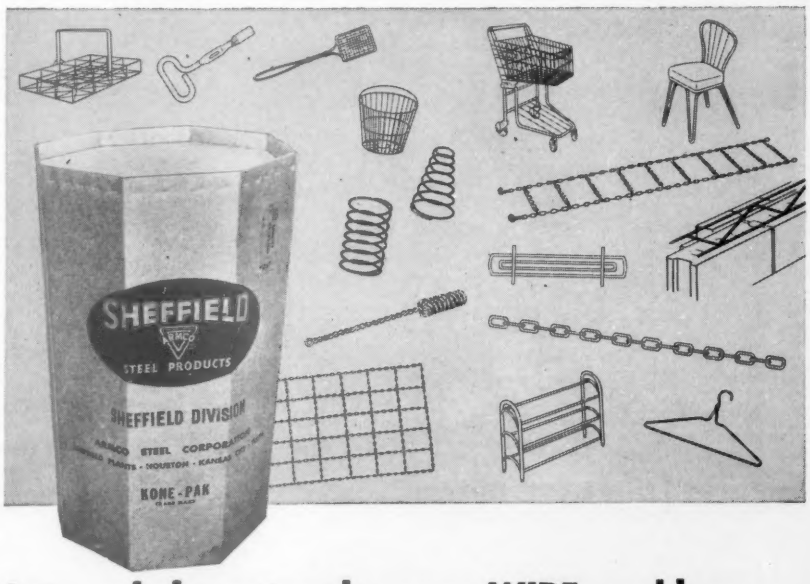
Prior to joining the Leschen organization in 1945, he had been employed by Roebling for more than twenty-three years. He entered the Corporation's Chicago district office in 1922 and was named assistant district manager in 1939. Transferred to Trenton in 1942, he worked in the purchasing department and a year later was made assistant to the general manager of sales. He is a graduate of the University of Chicago.

Named Assistant Director of Research by Associated Spring

H. Perry Smith, formerly manager of Underwood's general research laboratory, has joined **Associated Spring Corp.,** Bristol, Conn., as assistant director of research, according to an announcement by **Walter E. Froehlich,** vice-president.

★ ★ ★

Mr. Smith will be located at the company's new research center in Bristol, where he will be directly in charge of setting up facilities for an expanded program of research and product development which Associated Spring has recently inaugurated.. Born in California in 1911, he was graduated from the University of California in 1934 with a B. S. in chemical engineering.



Let us help untangle your WIRE problems...

We're old hands at it. If you use manufacturers' wire, you may have a lot to gain by getting in touch with your nearby Sheffield office. Our metallurgists and wire specialists can analyze your wire uses and make recommendations that may speed production, improve products and cut costs for you.

Sheffield's steelmaking and wire drawing facilities enable us to supply the right wire for any set of specifications. We're doing it for manufacturers and fabricators of more than 2000 different products. We'll not only come up with the right wire for you, but we are often able to recommend more economical ordering units.

Finally, there's Sheffield packaging. Our Kone-Pak* gives you in one continuous spool the equivalent of 2 to 40 ordinary coils. Kone-Pak saves handling and machine downtime for loading. With it comes the protection of specially treated wrapping that assures rust-free delivery and storage of your wire.

Just call your nearest Sheffield office.

Pat. Pending

SHEFFIELD

Wire Products

Sheffield serves the Midwest, Southwest and Gulf Coast with one of the most diversified lines of finished and semi-finished steel products in the steelmaking industry.

SHEFFIELD DIVISION ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA — OFFICES IN PRINCIPAL CITIES

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,780,246, COIL WINDING MACHINE, patented February 5, 1957 by Werner H. Steger, Chicago, Ill.

A winding machine for beam-deflection coils is claimed in the sixteen claims of this patent and includes a rotatable support adapted to have an elongated coil form mounted thereon; a wire feed including a wire guide adjacent the support and adapted for relative longitudinal movement with respect thereto; a first drive means for effecting intermittent rotational reciprocation of the support; and a second drive means for effecting intermittent longitudinal reciprocation between the wire guide and support.

★ ★ ★

No. 2,780,270, DEVICE FOR CONTROLLING THE PITCH OF HELICALLY COILED WIRE, patented February 5, 1957 by Leo J. Brancato, Danbury, Conn., assignor to Heli-Coil Corporation, Danbury, Conn., a corporation of Delaware.

Included in the apparatus for forming from a wire stock, a continuous coil progressing in the direction of the coil axis and rotating during its progression, is a device including a pitching roller having a substantially roof-shaped periphery and being adapted to engage with this periphery between two adjacent coil convolutions diametrically opposite a point intermediate two supporting rollers.

★ ★ ★

No. 2,780,420, WIRE SPOOL, patented February 5, 1957 by Jacob J. Mitnick, Highland Park, Ill., assignor to Magnet Wire, Inc., Chicago, Ill.

The spool comprises a pair of cups forming flanges and a cylindrical wall between them which is reinforced by a number of spaced-apart button and socket formations.

★ ★ ★

No. 2,780,860, SPECIAL SHAPED WIRE, patented February 12, 1957 by Alan E. Brickman, Amherst Township, Erie County, New York, assignor to United States Steel Corporation, a corporation of New Jersey.

For an anti-skid device, the invention provides a wire having a number of spaced apart pinched ears integral therewith and all extending therefrom in substantially the same upward direction, each ear having an arcuate portion extending from the surface of the wire and a portion extending below the surfaces of the bar adjacent thereto, the remaining cross-section of the wire at the ears being of the same shape as the portions of the wire adjacent thereto.

★ ★ ★

No. 271,083, SPRING STRUCTURE, patented February 12, 1957 by Paul Agrillo, Gilroy, Calif.

A spring structure is disclosed comprising a number of helically coiled springs having at least two equidiametered dead convolutions at each of their ends, said dead convolutions being disposed at right angles with respect to the axes of the springs, and adapted to receive a diaphragm of flexible material with the marginal edges thereof disposed between the last and penultimate ones of the dead convolutions.

★ ★ ★

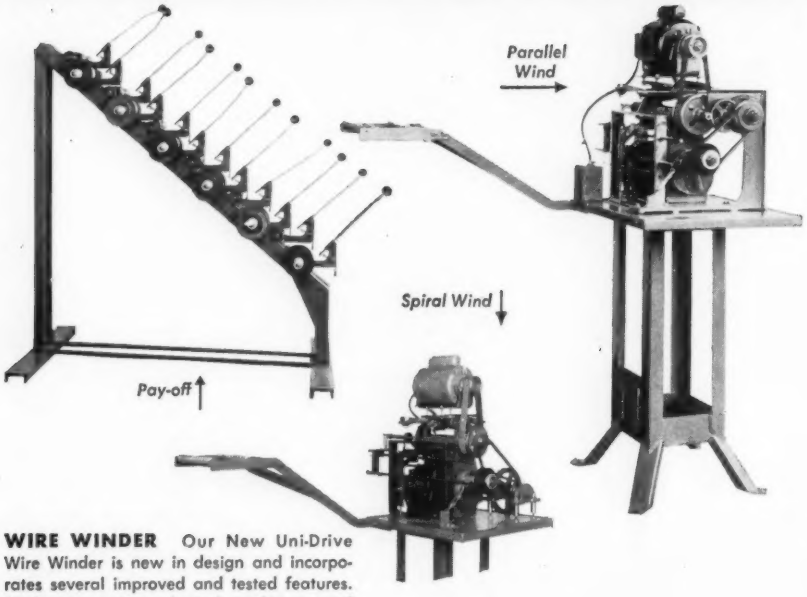
No. 2,782,138, WIRE TAPING MACHINE, patented February 19, 1957 by John W. Olson, Hastings on Hudson, and Samson Sortland, Dobbs Ferry, N. Y., assignors to Anaconda Wire and Cable Company, a corporation of Delaware.

Adapted to superimpose a number of helical layers of paper tape upon a wire, this machine includes an immobile tubular member mounted coaxially within a rotatable sleeve member, with the tubular member providing a path for the wire, a wire-feeding die mounted on the tubular member, and a taping head fixed to the sleeve member at the same end as the die.

★ ★ ★

No. 2,782,251, CABLES FOR HIGH FREQUENCY USE, patented February 19, 1957 by Lawrence C. Ebel, Dobbs Ferry, and Ralph G. D'Ascoli, Yonkers,

STANDARD UNI-DRIVE WIRE WINDER



WIRE WINDER Our New Uni-Drive Wire Winder is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel — no over or under-winding. Can also be furnished with a slight spiral pattern for winding exceedingly fine wire. Automatic Stop Motion controls each strand. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors.

Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAY-OFF Our Pay-off Attachment consists of a heavy fabricated frame on which Pay-off spools are mounted to cover desired number of ends to be wound. Equipped with spindles, running on self-aligning ball bearings, with size of spindles and adapters to accommodate customers' pay-off spool. Compensating Attachment to control the tension of each individual strand of wire, applying the same tension when spool is full as when empty. Can also be adapted for use with bunching machines.

STANDARD MILL SUPPLY COMPANY
31 ESTEN AVENUE PAWTUCKET, R. I., U. S. A.

N.Y., assignors by mesne assignments to Belden Manufacturing Company, Chicago, Ill., a corporation of Illinois.

A pair of spaced conductor wires is provided with a continuous core of multicelluar, low density insulating material separating the wires, and a sheath of high density insulating material impervious to fluid and compatible with the material forming the core surrounding the wires and core, the core having a dielectric constant less than that of the sheath, at least a substantial proportion of the individual cells in said core being sealed from each other and the core being bonded directly to the sheath to prevent the longitudinal flow of gas or vapor through the interior of the sheath.

★ ★ ★

No. 2,782,492, METHOD OF BONDING FINE WIRES TO COPPER OR COPPER ALLOYS, patented February 26, 1957 by Arthur L. Frost, Wilmington, Del., assignor to Atlas Powder Company, Wilmington, Del., a corporation of Delaware.

Nickel-zinc-copper alloys or nickel-cobalt-iron alloys wire is laid upon a fine high resistance wire in contact with the surface of copper or copper alloys material and an electric current transversely through the nickel alloy wire, high resistance wire and the copper or copper alloys material or their point of crossing, to cause the nickel alloy wire to fuse and flow down about the high resistance wire and to weld to the high resistance wire and to the metal surface.

★ ★ ★

No. 2,782,809, COIL WINDING MACHINE, patented February 26, 1957 by Bruce E. Smallridge, Irondequoit, N.Y., assignor to Genesee Machine Builders, Inc., Irondequoit, N.Y., a corporation of New York.

The machine includes a coil support comprising a number of pivoted jaws, spaced equiangularly about a common axis, a device constantly urging the jaws about their respective pivots toward the axis to move the jaws to collapsed position, and means for holding the jaws in extended, coil-supporting position.

Moves Sales Office to New York

Robert F. Bourne, Director of Sales—National Accounts for **The Colorado Fuel and Iron Corp.,** has moved his headquarters from Claymont, Del., to the corporation's New York office at 575 Madison Avenue, according to **F. S. Jones,** vice president in charge of sales. The New York location will give Mr. Bourne more direct contact with CF&I customers in this area and in other parts of the country.

New Ready-Cured Tank Lining Materials

New materials and methods that offer distinct advantages for tank lining, including economy over natural rubber, have been announced by Du Pont's Fabrics Division.

★ ★ ★

This tank-lining sheet provides superior over-all chemical resistance. Ready-cured, it eliminates the necessity of curing in the field or any need for moving equipment from operational location. It is stable in storage and therefore requires no refrigeration. Stretch approaches that of natural rubber lining.

★ ★ ★

"Fairprene" T-5594 ready-cured synthetic rubber lining material has been developed for tank lining applicators and firms doing their own lining. It is offered as part of a package consisting of primers and adhesives for adhering to supporting metal tanks, an adhesive for strapping seams, and a putty for filleting joints and corners.

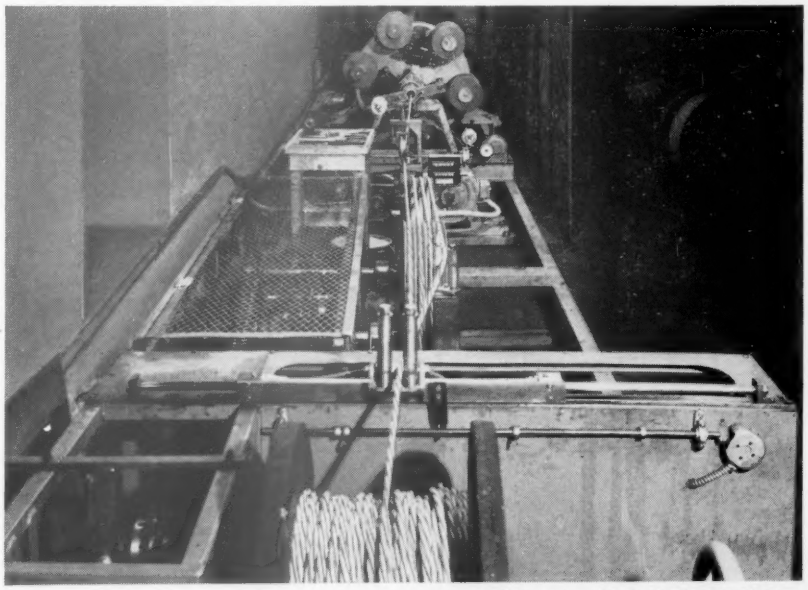


Photo courtesy of Bedford Wire & Cable Corp.

For Cleaner, More Economical Operation, Use

PLYMKRAFT

CABLE FILLER

Just name the type put up and the type treatment—such as wax, jute saturant, anthracene—to conform with your equipment requirements and see the difference Plymkraft can make in your operation. Cleaner to use, always uniform and made to a fine tolerance, these fillers are ideal for high speed cablers where extra strength is a must. If you would like to know how you can have a cleaner, more economical cable operation ask your Plymouth Plymkraft salesman—Or if you have a cable filler problem our engineers are available for consultation—just write.

PLYMKRAFT DIVISION

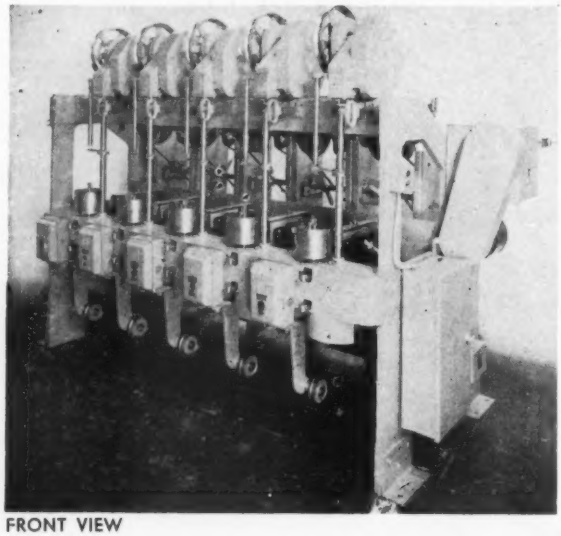
PLYMOUTH CORDAGE COMPANY

PLYMOUTH, MASSACHUSETTS

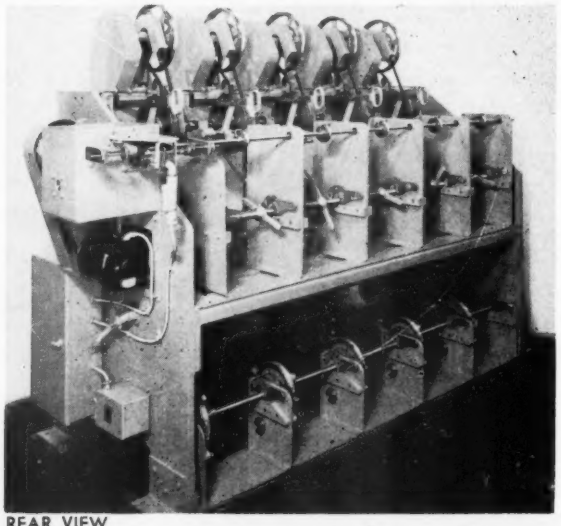
COPPER - Consumption of refined copper in the United States, November-December 1956, in short tons

	Wire mills 1/	Brass mills 2/	Chemical plants	Secondary copper smelters	Foundries and miscellaneous	Total
November:						
Cathodes	613	7,367	(3)	76	(3)	8,056
Wire bars	63,347	5,501	(3)	-----	(3)	68,848
Ingots and ingot bars	1,609	6,239	(3)	160	(3)	8,008
Cakes and slabs	------	12,670	(3)	2	(3)	12,672
Billets	------	12,566	(3)	-----	(3)	12,566
Other	------	------	(3)	36	(3)	36
Total	65,569	44,343	(4)	274	(4)	4/113,186
December:						
Cathodes	490	6,778	(3)	119	(3)	7,387
Wire bars	61,575	4,268	(3)	-----	(3)	65,843
Ingots and ingot bars	1,471	6,613	(3)	128	(3)	8,212
Cakes and slabs	------	13,580	(3)	-----	(3)	13,580
Billets	------	11,379	(3)	-----	(3)	11,379
Other	------	------	(3)	35	(3)	35
Total	63,536	42,618	(4)	282	(4)	4/109,436

1/ Includes all wire mills with rod-rolling facilities. 2/ Includes all brass mills using copper in refinery shapes; some have rod-rolling facilities. 3/ Not available. 4/ Consumption by chemical plants, foundries, and miscellaneous plants not included. Estimate of 3,000 tons included in total.



FRONT VIEW



REAR VIEW

#2S-5-MBB INSULATION WINDING MACHINE

APPLIES SINGLE COVER TO 5 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B & S GAUGES (.057" TO .018" OR 1.450 TO .455MM). STANDARD CAPSTANS 8" DIAMETER, BUT MACHINE ILLUSTRATED IS SPECIALLY ARRANGED WITH 12" DIAMETER CAPSTANS, IN PLACE OF STANDARD 8", FOR HEAVIER WIRES. SUPPLY WIRE LET-OFFS AND TAKE-UPS ARE AT REAR OF MACHINE.

EST. 1855 AIMco INC. 1915

"American" AIM INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.

Wall Chart of Conversion Factors

A Reference Table for Engineers and other Executives in Wall Chart form has been published by Precision Equipment Co. This Conversion Chart is amazingly useful for engineers, shop men and other executives.

★ ★ ★

Included are common conversions such as inches to centimeters or watts to H.P. as well as many conversions that are difficult to locate in reference manuals. (Some such examples are atmospheres to Kgs/sq. cm, cm/sec to miles/hr., cu. ft. to liters, microns to meters, quintal to lbs., etc., etc.).

★ ★ ★

For a free Wall Chart of Conversion Factors, write Precision Equipment Co., 3716 N. Milwaukee Ave., Chicago 41, Ill.

Wire Products May Be Made in Jamaica

The manufacture of barbed wire and wire fencing, wire nails, fence staples and tacks has been approved under the Industrial Incentives Law of Jamaica, it has been announced by **Harold A. Braham,** general manager of the Industrial Development Corp., Jamaica, B.W.I.

★ ★ ★

The approval is the first step in establishing a new industry here by a manufacturer, who after obtaining approval of the product may apply for approval of the company as one which can take advantage of Jamaica's liberal tax and duty allowances.

★ ★ ★

Manufacturers of barbed wire and wire fencing, wire nails, fence staples and tacks interested in establishing plants in Jamaica now need only obtain Government approval of the individual company to receive the benefits, Mr. Braham said, since approval of the product itself has been granted.

TO SELL—ADVERTISE IN
WIRE AND WIRE PRODUCTS
It pays—send for rates
453 Main St., Stamford, Conn.

Announces New Fire and Corrosion Resistant Plastic

A new plastic resin reinforced with fiberglass has been developed by **Haveg Industries, Inc.,** Wilmington, Del., that provides complete corrosion resistance for a wider range of conditions than the best previous polyester resins. The new formulation — Haveg 6610 — has greater impact strength, while just as light in weight as polyester. A further advantage is its sharply improved fire resistance.

Standard and special tanks, fume ducts, hoods, towers, trays and other process equipment are available. Any process equipment that can be produced in polyester glass can be successfully and economically fabricated from this new Haveg resin. While the range of chemical corrosion resistance is said to be substantially greater, prices are reported to be equal to, or less than, that of comparable polyester equipment.

ALUMINUM STATISTICS

PRIMARY ALUMINUM PRODUCTION
IN THE UNITED STATES
(in short tons)

1957	
January	147,030
1956	
December	148,391 *
Total for the year 1956	1,679,247 *
1956	
January	140,394
All-time record month	
July 1956	151,624
All-time record quarter	
4th 1956	442,597 *

* Revised from previous reports

Heli-Coil Acquired by Topp Industries

Shareholders of **Topp Industries, Inc.**, Los Angeles electronics and instruments firm, have voted to acquire the assets of Heli-Coil Corp., Danbury, Conn., in a three-way merger for broader service to the high production and equipment maintenance industries, **B. F. Gira**, president, has announced. The stockholders of Heli-Coil approved the action.

★ ★ ★

Primary products of the Heli-Coil Corporation are patented thread inserts used in applications requiring strong threads for bolts or screws in soft materials such as aluminum, magnesium, and plastics. Heli-Coil inserts are also widely used in salvage and repair work wherever threads in a tapped hole are stripped accidentally or through wear. The company has recently perfected a "Mid-Grip" insert which eliminates the need for lock nuts or safety wire to secure bolt connections. Heli-Coil also produces a complete line of precision tools for high volume production, including special tapes and gages, for the use and application of inserts.

Bulletin on Moly-Sulfide Lubricant Additive

"Moly-Sulfide Lubricant Additive," a new 12-page illustrated bulletin explaining Moly-Sulfide's function as a lubricant additive and describing commercial uses, has been issued by **Climax Molybdenum Company.**

★ ★ ★

The bulletin summarizes the lubricating characteristics of Moly-Sulfide-containing lubricants as demonstrated by such standard tests as the Shell 4-Ball EP Test, Falex Anti-Weld Test and the Timken Test. Data given show that Moly-Sulfide additive lowers wear rates of metal surfaces under extreme conditions, increases load capacity and extends the life of lubricants.

★ ★ ★

Among the commercial applications of the additive cited are chassis grease, railroad journal

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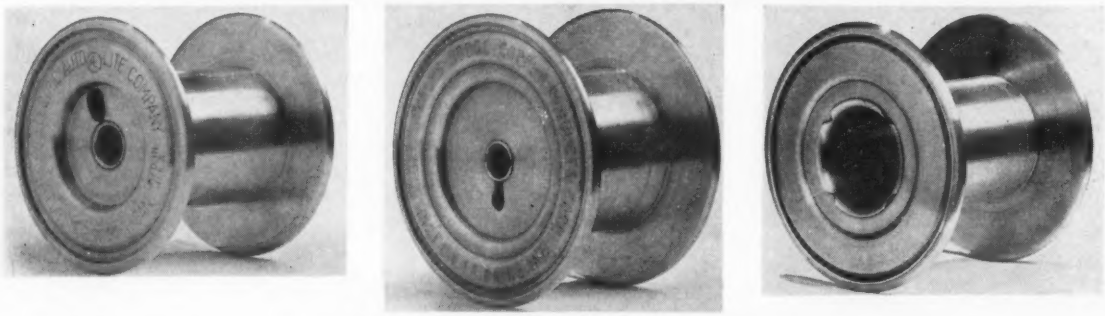
HUBBARD ALUMINUM SPOOLS



NEW FEATURES

1. STRONGER ALUMINUM HEAD — NO WEIGHT INCREASE
2. WELDED CONSTRUCTION — NO OPENING AT HEAD AND BARREL
3. SMOOTH SURFACES — NO SNAGS; REDUCES WIRE SCRAP LOSS
4. UNIFORM TARE WEIGHT — IDEAL FOR BULK WEIGHING

Check with HUBBARD for your spool needs.

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GARRETT (Tel.: Garrett 840) INDIANA

grease, steel mill roll-neck grease, oil drilling-tool joint compound, heavy-duty machine grease, drawing compounds, and die lubricants. Information on the Moly-Sulfide content and the results of field and laboratory tests for each application are presented.

★ ★ ★

Copies of the bulletin, designated Bulletin Lu-6, are available on request from Climax Molybdenum Company, Dept. L, 500 Fifth Avenue, New York 36, N. Y.

Tension Indicated Electrically

All Tension Meters known to date show tension visually only. Now a novel electrical contacting device calls the attendant by the flashing of an electric light when tension goes above or below pre-set limits of best operation in textile, wire and rubber mills.

★ ★ ★

The tension annunciator is attached to the new Saxl Tension Meter. Mounted upon an insulating cover, a U-shaped holder on top of the meter holds two tension setting screws with special contact points. They can be adjusted so that the lever tilting between them makes contact at any desired tension. Connected to the sensing lever in between them travels an electric contact, the position of which is determined by the tension. Filaments are guided over the rollers of the electric tension indicator.

★ ★ ★

A transparent cover protects the contacts. They are free from arcing due to a special circuit. The instrument is free from indefinite contacting and contact burn-out, despite standard 115-volt operation. All electrical connections are inside a small switch-box. On the other side of this box is a flexible cable which feeds a clearly visible indicator lamp on the stand to call maintenance personnel.

★ ★ ★

The electrical tension unit is small, light in weight and can easily be attached from the holes in its handle to any type of frame.

For further details, write to Tensitron, Inc., Harvard, Mass.

To Sell G.E.'s Silicones in East

George A. Darsie has been appointed Eastern District Sales Manager for the **Silicone Products Dept., General Electric Co.,** by **J. T. Coe,** sales manager. Associated with General Electric for nearly 10 years, Mr. Darsie was one of the first to join the sales force of the Silicone Products Department when G.E. began full scale development of its silicone operation after World War I.

★ ★ ★

Headquarters for the Eastern District is at 254 Elizabeth Ave., Newark, N. J., one of the 10 sales offices of the department throughout the country. He is a graduate of Kansas University, with a degree of B.S. in electrical engineering.

★ ★ ★

He succeeds **A. L. Baldock,** who has been promoted to sales manager for the recently established G-E insulating materials business at Schenectady.

(ILLUSTRATED) -
42" x 20" x 21"—(4000# cap.)

HEAVY DUTY
BREAK-DOWN REELS

1000#
2000#
4000#
} capacities

Rugged Design including patented DURA-CURL rim, and many other features necessary to provide the *Strength* and *Durability* needed for continued successful performance.

Also complete line of sizes of Modern High Speed Wire Drawing NO-CREV Spools and Reels for both fine and intermediate size wire.

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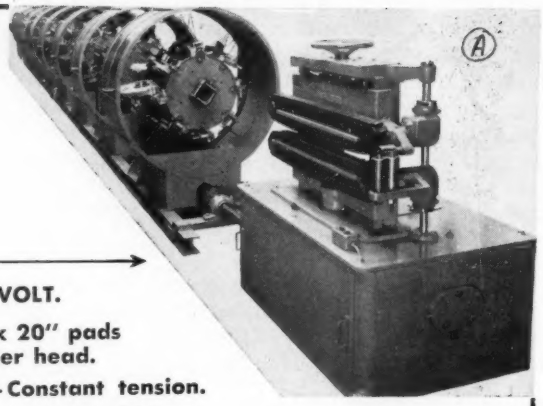
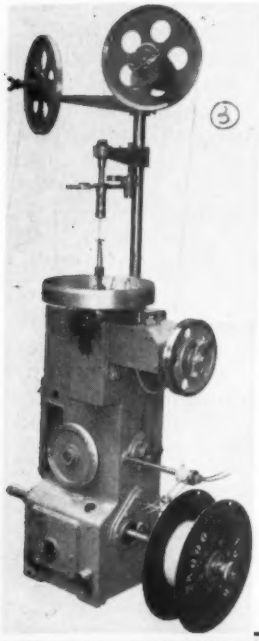
#103

NEW...

IN PAPER LAPPING





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— High speed paper lapping.
— 3,000 r.p.m.
— Movable drum.
— Automatic stop.
— 12" pad.
— Electric counter.
— Central lubrication.

FOR HI. VOLT.

— 8 x 20" pads per head.
— Constant tension.
— Extensible pad centre.
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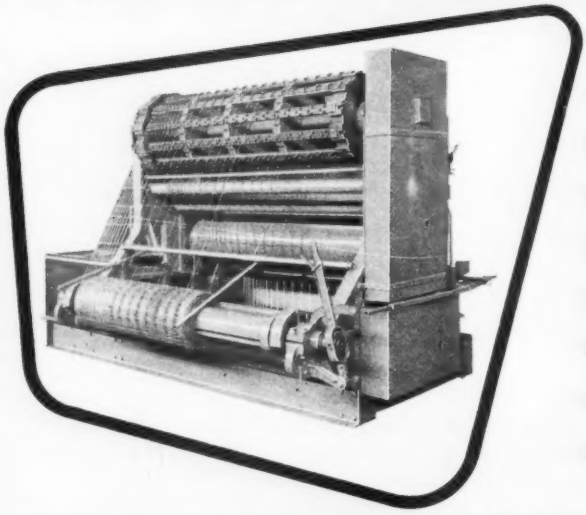
ROMAINVILLE (Seine) FRANCE

Interlocking **FENCE LOOMS**



- Fastest — Most Efficient
- Preferred by Leading Mills
- Low Maintenance Cost
- Wrapped Stay Fence
- Straight Stay Wires
- Integrated — Space Saving
- Replaceable Main Bearings
- Single or Double Strands
- Years of Low Cost Production

Write for Detailed Information — Without Obligation

Interlocking Fence Co., Box 8, Morton, Ill.

Specialists In Fence Looms

Nopco Announces Formation of New Lab Unit

The Nopco Chemical Company has announced the formation of a new laboratory unit. Operating under **Dr. M. J. Kelley,** Director of Nopco's Industrial Specialities Laboratories, and Chief Chemist **Henry R. Thompson,** the new unit will be responsible for an accelerated program of evaluating new chemicals as vinyl stabilizer components. Nopco, through its subsidiary the **Metasap Chemical Company,** a leading producer of vinyl stabilizers.

Wire Cloth Concern Gets New Vice President

Robert T. Dunlap has been elected vice president of **The American Wire Fabrics Corp.,** a subsidiary of **The Colorado Fuel and Iron Corp.,** it was announced by **A. F. Franz,** CF&I president. The company, one of the leading producers of insect wire screening, has its plants at Mt. Wolf, Pa.

* * *

Mr. Dunlap was formerly associated with the **Wickwire Spencer Steel Company** and later with CF&I after the merger of the two companies in 1945. In 1947 he joined the Great American Industries, Inc. company and served as president and chairman of the board until 1956.

* * *

He served from 1939 to 1943 as vice president and general manager of the Vulcan Iron Works in Wilkes Barre, Pa., and before that time as works manager of The Vulcan Mold and Iron Company in Latrobe, Pa.

* * *

From 1922 to 1932 Mr. Dunlap was general superintendent of all foundries for the **Jones and Laughlin Steel Corp.** in Pittsburgh, Pa.

G.E. Metallurgical Dept. Shifts Kunz

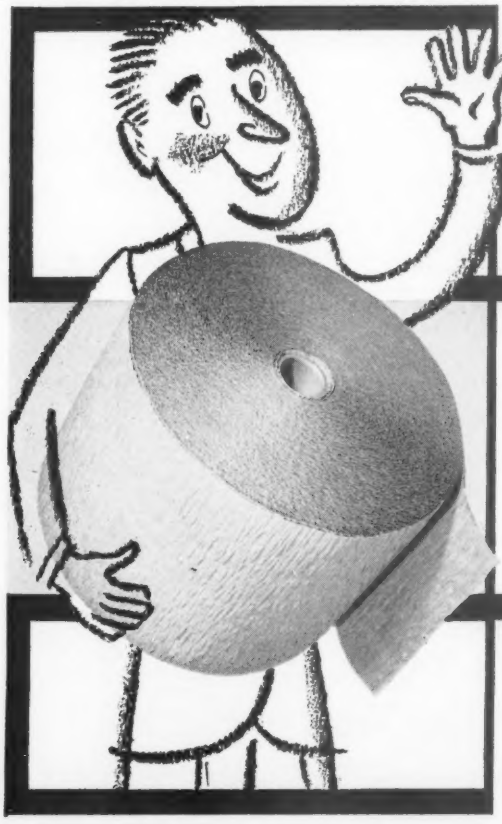
Paul Kunz, formerly Carboloy cemented carbide tool sales representative in the Flint, Mich., area for **General Electric's Metallurgical Products Dept.,** Detroit, has been named component sales representative for the Department in the Texas area, succeeding **Grant Morrison,** who returns to Detroit. Mr. Kunz will make his headquarters in Houston.

Correction

In our March issue on page 287 a typographical error in the editor's note resulted in the word "electroplating" for "electropolishing," with which subject Mr. McFee's article was concerned. A check of the copy sent to the printer shows that the correct term had been used. Our apologies to Mr. McFee.—The Editor.

To Install Patenting Furnace for Leschen

Leschen Wire Rope Div., H. K. Porter, Inc., St. Louis, Mo., has awarded a contract to **The Gas Machinery Co.,** Industrial Furnace Div., Cleveland, Ohio, to install a 60′ Wire Patenting Furnace with 30′ Lead Quench and a 40′ Rod Patenting Furnace with 20′ Lead Quench.



HERE ARE 5 GOOD REASONS FOR USING Rinkle Krinkle Spiral Wrap

1. Only No. 1 Northern Kraft Paper is used in the manufacture of Rinkle Krinkle Spiral Wrap.
2. Rolls can be supplied in any weight, width, or diameter.
3. It is manufactured by a company that has 30 years experience making spiral wrap exclusively.
4. Items wrapped with Rinkle Krinkle Spiral Wrap are very attractive, which greatly increases sales appeal.
5. Five types available include Krinkle Kraft, Krinkle Waxo, Krinkle Waterproof, Krinkle Nylon Reinforced, and Krinkle Resin Laminated.

If you use Rinkle Krinkle Spiral Wrap once, you will want to use it every time.

Rinkle Krinkle Paper Company

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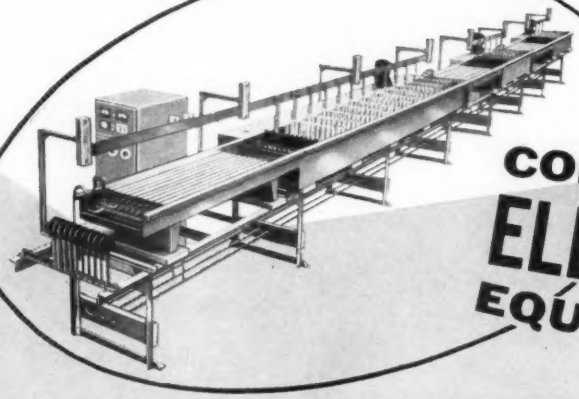
CUT WIRE PLATING COST!

maintain uniformity on copper and aluminum wire



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This low cost equipment performs uniform high quality work at speeds that mean real savings. Simple to operate. We furnish complete installation.

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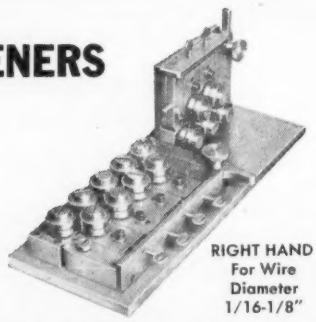
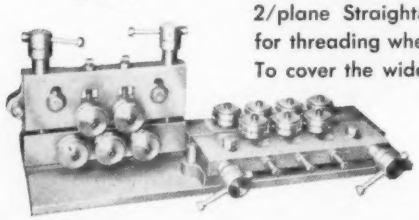
Sjogren 2 PLANE ROLL STRAIGHTENERS



RIGHT HAND
For Wire Diameter 1/16-1/8"

Sjogren Two Plane Roll Straighteners are fully ball bearing for heavy production duty. They are designed to accommodate all sizes and grades of round or shaped wire whether it be high carbon, low carbon or copper, as well as the many alloys, from .010" to .375". Once set for the job at hand Sjogren 2/plane Straighteners may be opened and closed for threading when making coil changes without effecting the adjustment of the setting. To cover the wide range of wire diameters there are several size groups manufactured with either left or right hand direction. Each is individually produced to exact specifications for the grade, size and type of wire to be processed. Sjogren Two Plane Roll Straighteners do their duty each day, every day in the year.

LEFT HAND
For Wire Diameter 3/16-3/8"



Used by Wire Men Who Want the Best!

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WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

SJOGREN TOOL AND MACHINE CO., INC.

Tools for The Wire Industries

14 SWORD STREET, AUBURN, MASSACHUSETTS

Metal Physics of Corrosion

The Metal Physics Committee of **The Institute of Metals** is organizing a Discussion on "The Metal Physics of Corrosion and Oxidation," to be held at Church House, Great Smith Street, London, S.W.1, on the afternoon of Tuesday, 30 April, starting at 2:30 p.m. The discussion will be opened by **Dr. O. Kubaschewski,** National Physical Laboratory, and **Dr. C. Edeleanu,** Tube Investments Research Laboratories.

★ ★ ★

Visitors will be welcome; tickets of admission are not required.

Special Alloy has High Creep Strength

A new self annealing tin base solder that offers unusually high creep strength, yet can be applied at substantially lower temperatures than silver solders and brazing alloys, 428-435°F, has been announced by **Alpha Metals, Inc.** of Jersey City.

★ ★ ★

Called #38 alloy, the solder eliminates the possibility of distortion generally resulting from excessive heat and ends low conductivity problems caused by oxide films produced by brazing fluxes.

★ ★ ★

#38 is a lustrous alloy, looking like stainless steel, that flows and has good wetting properties. While the creep strength is less than that of silver solders, it is high enough at the usual stress loads to withstand creep.

★ ★ ★

The alloy is available in diameters of .032 to .125 of solid wire.

New Armor Wire Server Announced

Wardwell Braiding Machine Co., Central Falls, R. I., has announced the availability of a new, improved Wardwellian Armor Wire Server, Type M-E.

This machine applies multiple ends of wire to electrical conductors for underground distribution cable and other applications. Eighteen ends of flat wire, .009 x .047, can be applied at the rate of 250 inches per minute. Wire is supplied on spools each weighing up to 10 pounds filled.

★ ★ ★

The pay-off and wind-up stands will accommodate reels 30" to 48" in diameter, having a maximum weight filled of 5000 pounds. Reels are raised and lowered hydraulically. The wind-up stand is equipped with an automatic traverse, adjustable up to a 32" maximum length.

★ ★ ★

Many other valuable features are incorporated, all of which are described in a circular that will be mailed upon request. Write for bulletins describing the Armor Wire Server and the pay-off and wind-up stands that can be furnished separately or in pairs for many applications.

GREATER FLEXIBILITY IN WIRE STRAIGHTENING AND CUTTING WITH VARIABLE SPEED DRIVE

. . . in a low cost machine

- Select-O-Speed Drive permits selection of infinitely variable feed speeds from 25 to 155 FPM for all types of wire and rod.
- Available with super-sensitive electric trip mechanism.
- High-Speed Five-Die Straightener Arbor, mounted on ball bearings.
- Lewis engineered, simple, rigid, dependable . . . of best materials and workmanship.
- Ideal for manufacturers of stove and refrigerator racks, lamp shades, wire baskets, garment hangers, welding rod and other products where small diameter wire is used.

Lewis 1-C Automatic Wire Straightening and Cutting Machine. 1/16" to 1/8" capacity.

For further information write:

THE LEWIS MACHINE COMPANY

3441 EAST 76TH STREET • CLEVELAND 27, OHIO

The 1957 Wire Industry Encyclopaedic Handbook

The Wire Industry Ltd., 33 Furnival St., London E. C. 4, England, has issued its 1957 edition of this handbook, designed to be a reference book for the wire drawing and wire fabricating industries.

★ ★ ★

The contents embrace a trade summary for 1956; a buyers' guide to supplies; a list of brand names; a directory of articles that have appeared in The Wire Industry, preceded by a short selection of articles on wire subjects; a list of technical and trade terms; and an appendix of wire tables, general tables and other information.

★ ★ ★

Copies may be procured from the publisher.

Improved Remote Indicating Dynamometer

Although this instrument has been popular for many years in reading tension and weight remotely, **W. C. Dillon & Co., Inc.,** have announced a highly improved version of greater sensitivity.

★ ★ ★

Basically, the new unit is comprised of a standard Dillon traction Dynamometer, a pair of matched synchros and a remote case with a dial. One synchro is attached to the Dynamometer mechanism and the other to the back of the dial in the remote cabinet. Application of the slightest load is instantly transmitted to the remote indicator station, which may be up to 300 feet from the test area.

★ ★ ★

Instead of the former 8" remote dial, a 10" dial permits a finer increment breakdown for critical measurement. Overall circuitry has been improved, and synchros now have increased stability and more freedom from flutter.

★ ★ ★

These Dynamometers are available in capacities of 0-500 lbs., 0-1,000 lbs., 0-2,500 lbs., 0-3,500 lbs., 0-5,000 lbs., 0-7,500 lbs., 0-10,000 lbs., 0-15,000 lbs., 0-20,000 lbs., 0-30,000 lbs., 0-40,000 lbs., 0-50,000 lbs. and 0-100,000 lbs. All are capable of sustaining accidental overloads up to 25% without injury to calibration.

★ ★ ★

Although the remote indicating unit was formerly called the Tens-O-Trol, henceforth it will be called the "Dillon Remote Indicating Dynamometer."

★ ★ ★

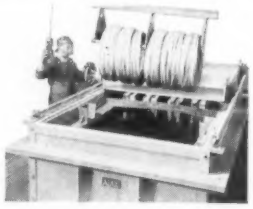
For further information, write the manufacturer at Box 3008, Van Nuys, Cal.

Riverside and Alloy Divisions Combine

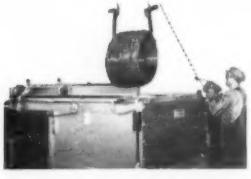
Porter's Riverside Metal Division and its **Alloy Metal Wire Division** have been combined under common management. Because of the corporate legal structure it is necessary to maintain the two operations as separate legal entities, but their sales, research, engineering and manufacturing skills will be merged.

★ ★ ★

The newly formed division, to be known as **Riverside-Alloy Metal**



TYPICAL — The Ajax installation at right treats 1000 lbs. of aluminum alloy wire an hour. It is also used for annealing brass and copper wire and for stress relieving cold headed C1008 ½" steel rods. (Lower left) 700 lb. charges of steel wire are brought to annealing temperature in less than 15 minutes, clean, scale-free and without decarburization.



faster
more uniform
heat processing
AT LOWEST EQUIPMENT COST

AJAX
HULTGREN
electric
SALT
BATH
furnaces

Heating cycles are a matter of minutes . . . NOT hours. Bigger charges are handled far faster . . . in less floor space . . . in electric salt baths that cost about half the price of atmosphere furnace equipment of equal capacity. Molten salt seals out all air, preserves wire surfaces, guards against scale and decarb. Wire quality and uniformity are improved . . . because no other method matches Ajax Salt Baths for heating uniformity. Ideal for low- and high-carbon steels, stainless, aluminum, copper alloys and silver alloys.

WRITE FOR case history bulletins on ☐ Process Annealing; ☐ Descaling; ☐ Patenting; or ☐ Cleaning, Preheating or Fluxing. These describe actual Ajax salt bath installations and actual wire processing results obtained.

AJAX ELECTRIC COMPANY
928 FRANKFORD AVENUE., PHILADELPHIA 23, PA.

Associates: Ajax Engineering Corporation • Ajax Electrothermic Corporation

Division, will be under the direction of Vice President and General Manager, **W. Harvey Thompson,** who held the same post at Riverside. Headquarters of the combined divisions will be at Riverside.

★ ★ ★

The combined sales and metallurgical research and manufacturing skill of the Division will offer greater customer service, faster delivery and complete sales coverage throughout the country.

New Type Extrusion Die Developed for Insulated Wire

The Wire Tool Div., Bridgeport Jig Boring Co., 303 Stratford Ave., Bridgeport, Conn., has announced the development of a new Tru-Rip Die Assembly with blades, that can be taken apart, cleaned, blades changed and re-assembled—all in a few minutes. The operation is easy, as well as quick. These dies are made for 2 and 3-wire Tru-Rip wire.

★ ★ ★

In addition, the company produces dies in round, figure 8, serrated, tracer and other shapes made to specification.

★ ★ ★

These dies are precision made of hardened steel, accurately ground and highly polished for long life and high production.

★ ★ ★

For more complete information, please write to the company.

Bulletin on Wire Rope for Construction Equipment

By means of photographs and drawings with reeving diagrams, a new brochure lists the proper wire rope specification for all types of construction equipment.

★ ★ ★

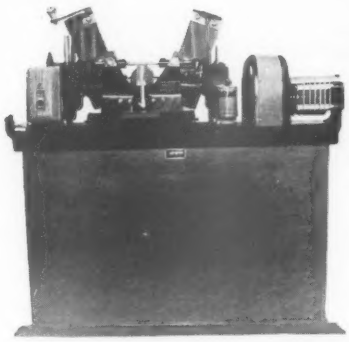
Included is a discussion of Lang Lay vs. Regular Lay rope, rope constructions and proper wire rope to use for clamshell bucket operation.

★ ★ ★

"Wire rope must meet three main requirements: Strength—Abrasion—Flexibility," brochure states, "In

PROFITABLE STRIPPING

OF YOUR SCRAP AND REJECTED WIRE & CABLE IS GUARANTEED WHEN YOU HAVE THE RIGHT MACHINE ON THE JOB.



Many of our machines have been in service up to 10 years. Our later MODEL "526" (pictured), with a capacity of 5/16" to 6", is now the accepted leader in the scrap and salvage trade. Strips short or long lengths, or off the reel.

For FAST and CLEAN CUTTING, in most cases actually taking the cable apart. No other machine can match the patented cutting action of the "526".

SAVES ALL RUBBER, PLASTIC, LEAD, COPPER AND ALUMINUM

Several models available for small or special work and plastic tubing.

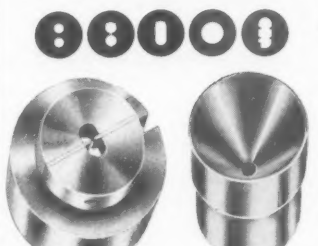
Detailed information available—ask for it

HOWARD A. BURDWOOD, INC.

P. O. BOX 2115, 120 THADEUS ST., SO. PORTLAND, MAINE

INSULATING DIES AND NOZZLES

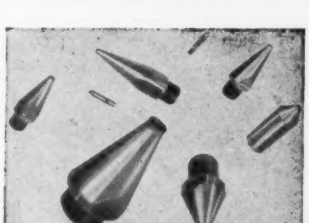
for EXTRA-HIGH ELECTRIC WIRE PRODUCTION



STEEL DIES—ALL SHAPES.

CARBIDE AND STEEL

Highest Quality Workmanship and Materials. Standard Types and Special.



CARBIDE EXTRUSION NOZZLES OR TIPS FOR ALL MACHINES.

BRIDGEPORT CARBIDE NOZZLES have phenomenally long life, will lower operating costs and reduce wire breakage.

BRIDGEPORT STEEL DIES are made in Round, Figure 8, Serrated, Tracer and other Special Shapes to your specifications. A newly designed Tru-Rip Die Assembly can be taken apart, cleaned, blades changed and reassembled quickly and easily. Made for 2 and 3 conductor wires to be coated in extrusion machines.

Write for folder or phone for information

WIRE TOOL DIVISION

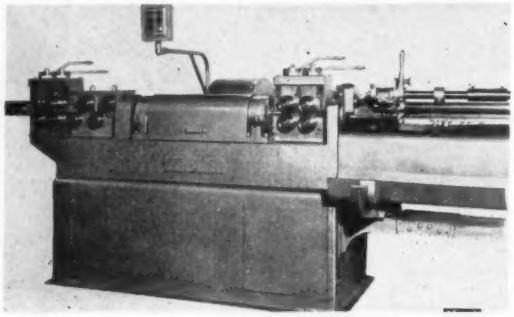
BRIDGEPORT JIG BORING COMPANY

303 STRATFORD AVE., BRIDGEPORT, CONN. **TEL.: FOREST 7-8473**

LEADER IN HIGH PRODUCTION EXTRUSION TOOLS FOR ELECTRIC WIRE

New, Fast STRAIGHTENER and CUTTER

Handles 1/4" to 1/2" Wire—3" to 50' Lengths



Model 9A, pictured, is for ferrous or non-ferrous heavy wires. Other models accommodate smaller stock.

The 9A feed and speed can be varied from 70 to 200 feet per minute.

OTHER FEATURES

Wichita low-inertia air tube clutch and air brake makes quick, clean and positive cut-off possible. Electric actuated trip. Motor control switch on swinging pendant. Tool storage in base. Bundling brackets. End pull-through device. Two 4-roll feed housings for positive feeding. Many other refinements—all features of the 9A and other models for finer wires.

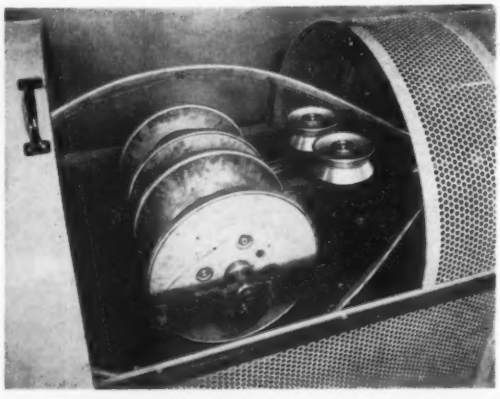
ALSO MANUFACTURERS OF WIRE REELS AND HI-HATS.

Send your requirements and ask for details.

The Geo. C. PATTERSON MACHINE Company

3409 Trumbull Street • Cleveland 15, Ohio

TWO-WIRE DOUBLE TWIST CONSTANT TENSION TWISTING MACHINE



Designed and built for the uniform twisting of finer wires as small as No. 26 gage.

Tension control is combined with over run prevention and slow acceleration to permit the use of large reels and long lengths of small diameter wires.

Speeds up to 2280 lays per minute.

Reel sizes up to 24 inches diameter and 9¼ inches overall width or 19 inches diameter and 13½ inches overall width.

These machines are very efficient high speed units.

For information on this efficient machine, write:

THE EDMANDS CO. **860 WELLINGTON AVE., CRANSTON 10, R. I.**

Tel. STuart 1-2205

all recommendations, these three factors must be weighed and the rope selected that will meet all three to the best advantage."

★ ★ ★

Called "The Correct Wire Rope for Contractors' Equipment," brochure is number 5702 and is available free. Address MacWhyte Company, Public Relations Dept., Kenosha, Wis.

Develop Super Carbide Tools

A new line of solid carbide end mills, precision ground by a revolutionary electrolytic grinding process, is announced by the **Abrasives Division of Elgin National Watch Co.**

★ ★ ★

The new "grinding" method is expected to have a far reaching effect on the carbide tool industry, since it reduces grinding heat in the tool manufacturing stage by more than 90 percent, eliminating heat-check damage.

★ ★ ★

The new process is one in which the diamond wheel receives a negative electrical charge while the carbide tool blank is positively charged during stock removal. Cutting is accomplished with a special electrolyte that is fed to the work with a wax-impregnated coolant.

★ ★ ★

Elgin will market the new tools under its "Golden Circle" trade name in diameters of from 1/16" to 1/2". All sizes are available from stock and special sizes will be available on order.

New Moly Lubricant Announced

The development of Molykote, Type GX, a molybdenum disulfide lubricant with a strong affinity for bonding to metal without building excessive accumulation on the surface, has been announced by **The Alpha Molykote Corp.**, Stamford, Conn.

★ ★ ★

Type GX is a refinement of Molykote, Type G, a highly successful molybdenum disulfide lubricant. In Type GX the maximum effectiveness of MoS_2 as an extreme pressure lubricant in a grease is

achieved by increasing the total surface area of the molybdenum disulfide through a reduction of particle size. This permits a sharp reduction of the MoS_2 content.

* * *

Additional information may be obtained from The Alpha Molykote Corp., 65 Harvard Ave., Stamford, Conn.

Wood Based Dies Eliminate Scoring on Wire

Since using Masonite Benelex 70 as straightening dies, the **Woodworth Specialties Corp.,** Binghamton, N. Y., manufacturer of wire goods, has eliminated scratches and score marks on certain types of wires passing through a wire straightening machine. The highly-dense Benelex 70, a wood based product, is used instead of cast iron dies and is giving satisfactory results both in wearing quality and straightening without scratching, according to Robert R. Woodworth, manager. The material is made by Masonite Corp., Box 777, Chicago 90, Ill.

Brochure on Diameter Control Equipment

A new brochure describing continuous, non-contact diameter measurement and control equipment for insulated wire and cable, extruded tubing and shapes is announced by **Industrial Gauges Corporation, West Englewood,** New Jersey.

* * *

The equipment described spans the range of 0.4 to 3.0″ in two standard sizes and up to 12″ in special sizes. Measurement, control and recording sections are offered in a variety of combinations to suit specific objectives.

Conduit Clamp Bracket Announced

T. J. Cope, Inc., Collegeville, Pa., has designed a new bracket to be attached to the side of a cable trough section to support cable, conduit or piping when crossing the side of the trough. It can be used with all standard conduit clamps and is secured by a simple bolt-

DANFORTH

FIRST QUALITY—PROPERLY-GRADED

DIAMOND POWDERS

Will give you maximum • • •

Value • Service • Economy

For this you pay a little more in first cost, but you save in faster work, in superior die finish and in better wire drawn. DANFORTH POWDERS are uniform in purity, quality, grain shape and accuracy of grading.

COMPLETE RECLAIMING SERVICE

The DANFORTH PROCESS of reclaiming produces powders that are *guaranteed* to be 99% or better pure.

Write today for information on diamond powders.

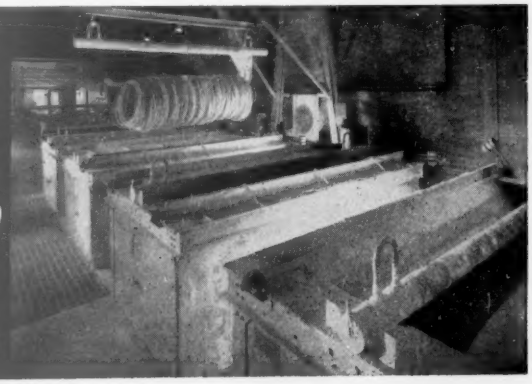
C. W. DANFORTH COMPANY

P. O. Box 448 Established in 1912 Youngstown, Ohio

carl mayer

HI-SPEED REGISTERED

ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
Driver-Harris Co.
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.
Sheffield Steel Div., Armco Steel Corp.
Steel Company of Canada

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361 2,323,828 2,235,559
Canada 396,144 401,589

THE carl mayer CORP.

3030 EUCLID AVE., CLEVELAND 15, OHIO

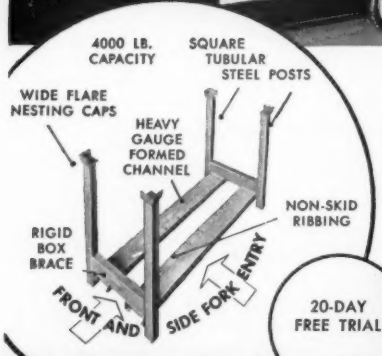
OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

JARKE

PORTABLE

WIRE COIL RACKS

COURTESY HOLO-KROME SCREW CORP.



Solve Wire Coil Storage Problems

Makes handling and storing of unwieldy wire coils a simple one-man operation. Improves plant housekeeping, saves space, provides positive inventory control. Front and side fork entry permits closer stacking and greater maneuverability in narrow aisles. Saves time, labor, cuts costs. Standard and special sizes.

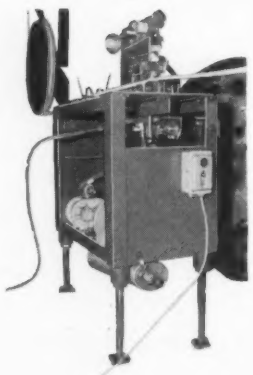
20-DAY FREE TRIAL

JARKE MANUFACTURING COMPANY

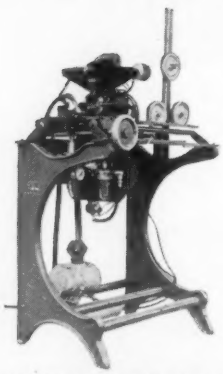
Send for Details
5407 Broadway
Chicago 40, Ill.

MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE

LABELING MACHINES for WIRE and CABLE



SE-300 SERVICE ENTRANCE LABELING MACHINE.
Designed for labeling Service Entrance Cable. Will apply a UL label every 20 feet. Fully automatic. Speed limited only by the speed of the wire.



FA-200 FLAG LABELER.
This machine has high operating efficiency—up to 3000 labels per hour. Used before an Artos Cutter, with speed governed by cutter. Completely automatic. Space available on labels for advertising.

Write today for detailed information.

DEWYER, INC.

P.O. BOX 208
LIBERTYVILLE, ILLINOIS
Telephone: LI 2-2161

type connector. This new clamp will be particularly useful when modernizing or expanding an existing electrical distribution system as it simplifies combining a cable trough supporting system with other types of cable supports. Flexible cables require continuous support and cable troughs permit higher cable current air ratings than are possible with other supporting systems because the air is free to circulate around the cables to disseminate heat.

New Coaxial Cable Announced

The Tensolite Insulated Wire Co., Inc. of Tarrytown, N. Y. has announced the development of an entirely new, air dielectric, Teflon insulated miniature Coaxial Cable. The recently developed cable has a nominal capacitance of 10 MMF/ft. at 1000 CPS, with a nominal overall diameter of .220". The conductor is #30 AWG, 7/38 silver plated Copperweld wire.

★ ★ ★

A choice of outer jackets of Teflon, lacquered nylon braid, Teflon or silicone impregnated glass braid, etc., are available as standard constructions.

★ ★ ★

The low attenuation of the 10 MMF cable makes it particularly useful for high frequency, low level applications and as low capacitance probe cable. Capacitance values of less than 10 MFF with somewhat larger overall diameters are also available on request.

★ ★ ★

Flexibility is pointed to as being the most significant feature of this new air dielectric coaxial cable. Among the other outstanding physical characteristics of the cable is its solderability, light weight, small size, and ready adaptation to a variety of connectors.

★ ★ ★

Information on the new coaxial cable may be had by writing or calling the **Tensolite Sales-Engineering Dept., Tensolite Insulated Wire Co.,** 198 Main St., Tarrytown, N. Y.

Computer for Control of Grinder

Based on a new electronic principle that permits automatic computation without sacrificing accuracy. the LI-AP **"Autopairer"** automatically controls any grinder to produce external pieces to fit bores within limits of desired radial play. Accuracy can be guaranteed down as low as .000040", regardless of the type of grinding machine.

★ ★ ★

This device eliminates the necessity for match gauging or selecting fits. The unit also dispenses with the necessity of making the usual mechanical settings on a grinder or resetting for wheel wear. Backlash is electronically compensated.

★ ★ ★

The finished bores are placed on the I. D. gauging anvil one by one. If necessary, when unwieldy large pieces are involved, they can be inserted in the I. D. gauge, which may be located up to 5 feet away from the grinder. The rough stem, or work piece, is then placed in grinding position, whereupon it is automatically ground to fit. No gauge readings are necessary.

★ ★ ★

The I. D. attachment can be disconnected, converting the unit into an L-I Autosizer for grinding a series of pieces all to an identical size within guaranteed tolerances.

★ ★ ★

For further information and prices, write EAM Division, **Industrial Gauges Corp.**, West Englewood, N. J.

New Continuous Furnaces

A new four page, two-color bulletin describes and illustrates Surface standard rated continuous heat treating furnaces.

★ ★ ★

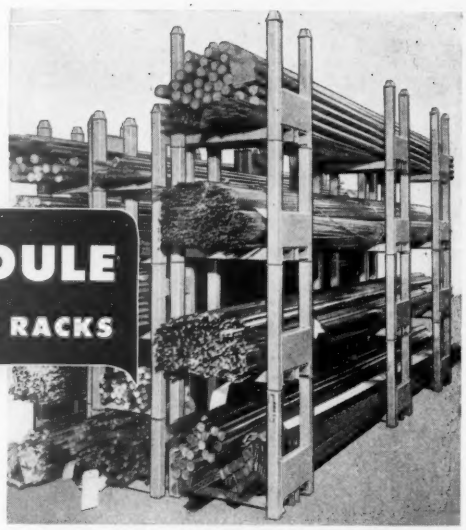
It contains specifications, process recommendation and application examples for Surface Snap Hearth, Cast Alloy Link Belt and Brazing Furnaces.

★ ★ ★

Request bulletin SC177 from **Surface Combustion Corporation**, Toledo 1, Ohio.

Store Your Bar, Rod and Pipe Stock Faster, Easier Neater, Safer

USE JARKE
MINI-MODULE
PREFABRICATED
STOCK STORAGE RACKS



Lightweight
Set Up or
Take Down
In Seconds
No Bolts
No Tools
No Fittings

JARKE
MANUFACTURING COMPANY
5407 N. Broadway
Chicago 40, Illinois

Jarke "Mini-Modules" provide the best, most flexible system for storing bar, rod and pipe stock. You can quickly set up, expand or decrease storage capacity to suit requirements. Saves space, improves stock appearance, simplifies inventory control, cuts costs. Sturdy steel construction with special "nesting" caps insures rigid, safe tiering. Four standard models.

20-DAY FREE TRIAL . . . SEND FOR DETAILS

MODULAR STORAGE SYSTEMS FOR METAL INDUSTRY • STEELMOBILE

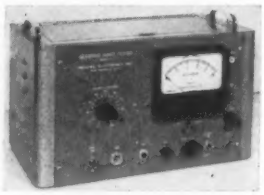
AT YOUR SERVICE

SPECIALIZED ENGINEERING
SPECIALIZED EXPERIENCE
SPECIALIZED MACHINERY
FOR
TWISTING • STRANDING • BUNCHING
Continuous Tension Control
For Precision-Quality

HASKELL-DAWES
MACHINE CO., INC.
2231 E. Ontario Street
Philadelphia 34, Pa.

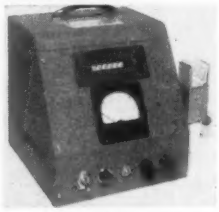
NON-DESTRUCTIVE DIELECTRIC TESTING

IS AT ITS BEST WITH PESCHEL EQUIPMENT



SENSITIVE HI-POT TESTER
Model H 5, AC/DC

An improved line that automatically deenergize high voltage when leakage current reaches 5 microamps. Models available from 2 KV to 120 KV. Will show leakage that less sensitive instruments cannot detect.



PINHOLE DETECTOR, COUNTER
Model P-1

Indicates and counts pinholes in insulation at speeds up to 600 fpm. For continuous production use on single or multiple conductor wire. Will not harm the finest wire. Comes in several voltage ranges.

A COMPLETE LINE OF DIELECTRIC TESTERS FOR WIRE.
SPECIAL TESTERS WILL BE BUILT TO ORDER.

Write for Catalogs or Telephone for Information

PESCHEL ELECTRONICS, INC.

13 GARDEN STREET
NEW ROCHELLE, N. Y.
Tel.: NE 6-3342

AUTOMATIC ELECTRIC
WIRE WELDING MACHINES
„Strecker-Autelдra"

Producing High Tensile Welds to Resist Subsequent Drawing

AUGUST STRECKER KG
Manufacturers of Electric Welding Machines
LIMBURG/LAHN • WEST GERMANY •

KO CO., INC
INDUSTRIAL IMPORTERS

Sole Distributor For The U.S.A.:
KURT ORBAN CO., INC., 34 EXCHANGE PLACE JERSEY CITY 2, N. J.

The Canadian Regional Meeting

The fourth **Canadian Regional Meeting** of The Wire Association will be held in Hamilton, Ontario, on May 13th and 14th at the Royal Connaught Hotel.

★ ★ ★

Committeemen responsible for the planning of the meeting are:

Laurence Atkinson, Frost Steel & Wire Co., Ltd.
Maurice Boyd, The Steel Company of Canada, Ltd.
Allan B. Dove, The Steel Company of Canada, Ltd.
George Globe, The B. Greening Wire Co., Ltd.
Charles S. Kidd, The Steel Company of Canada, Ltd.
Robert W. Lord, The Steel Company of Canada, Ltd.
Ralph Rutherford, The B. Greening Wire Co., Ltd.
William H. Waters, The Steel Company of Canada, Ltd.

★ ★ ★

Responsibilities for various activities were assigned as follows:

Chairman—Mr. Dove
Transportation—Mr. Globe
Publicity—Mr. Atkinson
Hotel—Mr. Waters
Treasurer—Mr. Globe

An after-dinner speaker of note will address the group on a subject of timely interest.

★ ★ ★

The R. H. Miller Company, Homer, N. Y., and the Standard Industrial Compounds Company, Frankfort, Ill., will be hosts to those in attendance at the Cocktail Hour scheduled to precede the dinner on May 13th.

★ ★ ★

Full details on the program, particularly on the fine technical session and plant inspection tour that have been arranged by The Committee, will be found elsewhere in this issue.

★ ★ ★

The Committee and The Association's Directors are anticipating a good turnout and will look forward with pleasure to seeing wire men from all parts of Canada and the United States in Hamilton for this meeting.

Manual on Thermoplastic Extrusion

A comprehensive technical manual on the fundamentals of thermoplastic extrusion has been published by **Monsanto Chemical Company.**

★ ★ ★

Robert D. Sackett, technical service associate and extrusion specialist for Monsanto's Plastics Division, said that increased demands for such extruded products as film, sheeting, pipe and wire have stressed the importance of proper extrusion techniques.

★ ★ ★

The number of extrusion machines in operation increased more than 20 per cent during the past year, while the number of injection molding machines increased only about 12 per cent in the same period.

★ ★ ★

A highly competitive market has resulted, in which it is important for extruders to have a thorough and up-to-date knowledge of extrusion technology. An effort has been made to include the most pertinent elements of this technology in the new Monsanto manual.

★ ★ ★

The manual contains both practical and theoretical discussions of the extrusion process. In separate sections it deals with the extruder, the screw, the die and post-extrusion equipment.

★ ★ ★

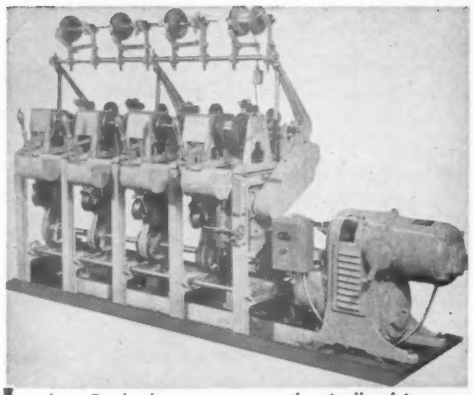
Also treated separately are the theory of melt extrusion, the isothermal theory, the adiabatic theory, screw and die characteristic curves, and major factors affecting screw characteristics. A two-page bibliography is included.

★ ★ ★

Monsanto is a major supplier of thermoplastic extrusion materials, including vinyl, polyethylene and styrene.

★ ★ ★

Copies of the manual may be had on request to Department EX, Monsanto Chemical Co., Springfield, Mass.



1900-HV MULTIPLE SPINDLE SPOOLER

SPECIFICATIONS
Size Range: .010" to .080" or heavier if soft and many flat wire sizes.
Max. Spool Size: 16" flange diameter.
Capacity: usually 4 to 8 spindles.

The 1900-HV Spooler is a rigid, precision machine which will consistently produce a uniform, dense wire lay. Both the traverse and spindle drives are regulated through wide-range, stepless, variable speed units, eliminating change gears. The 1900-HV is completely adaptable to your particular constant or changing demands. All controls are positive. Adjustments are made accurately with the spooler in operation and without tools.

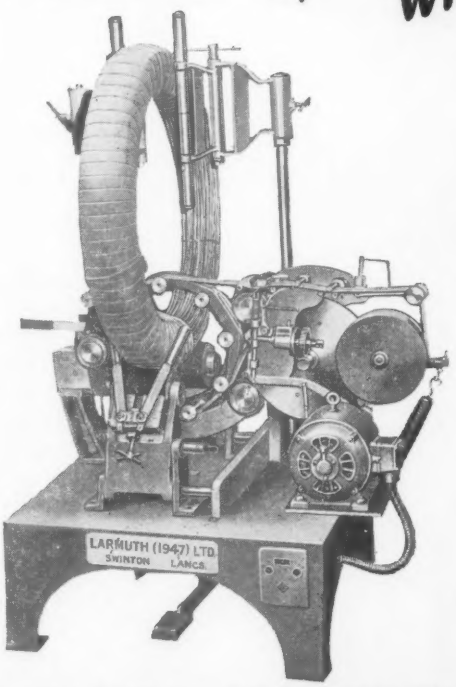
Both smooth acceleration and rapid stopping is obtained through a single lever at each station. Spool changing is simple and rapid. Anti-friction bearings are used on all shafting and spindles.

Your special requirements can be incorporated into the design. Each machine is delivered ready for operation from your power supply. Payoff stands furnished as extras.

Consult us on your spooling problems.

ROBERT J. EMORY COMPANY
31 East Runyon Street Newark 5, N. J.

LARMUTH *Spiral Wrapping* MACHINES



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New Brass Rod Mill Approaches Automation

A step forward in the direction of producing brass rod "untouched by human hands" has been achieved with the opening of the new Lewin-Mathes brass rod mill, according to an announcement by **Bram Lewin,** vice president in charge of production for the St. Louis company. The mill is the newest addition to the completely integrated **Lewin-Mathes Co.'s** tube, pipe and rod plant at Monsanto, Ill.

★ ★ ★

To prevent marring of the rod, keeping handling to a minimum is important. This is accomplished through a system of conveyor belts and overhead chain-type conveyors that carry the rod through the various stages of production.

★ ★ ★

Alloy billets are cast in electric furnaces to assure complete metallurgical control. So precise is this control that even the temperature of the water used to cool the molds is carefully regulated.

★ ★ ★

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★ ★ ★

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★ ★ ★

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Opens New Warehouse in St. Louis

The Carpenter Steel Company, Reading, Pa., has opened a new and larger mill-branch warehouse in St. Louis, Mo., to service and supply users of tool, stainless and alloy steels in its south-central sales territory, comprised of Missouri, southern Illinois, Kansas, Oklahoma, Arkansas, western Tennessee and the Texas Panhandle.

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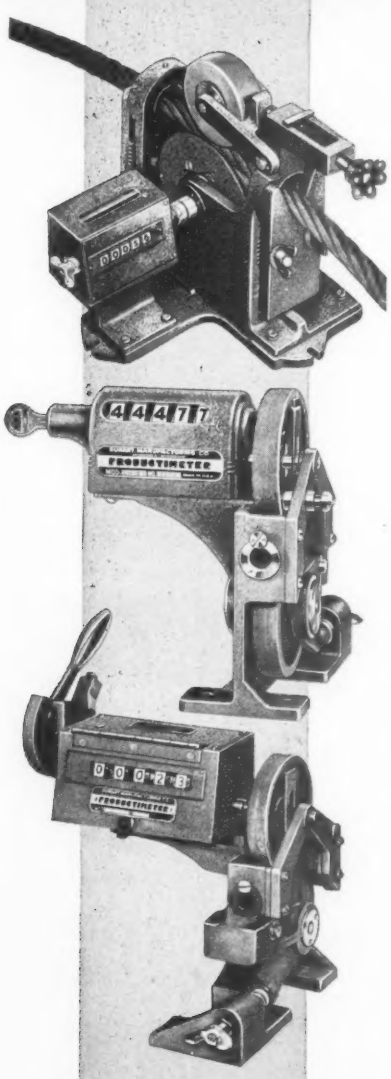

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* * *

The St. Louis warehouse is operated under the supervision of **L. E. Cooney,** district manager, and **Paul Holtz,** assistant district manager, both of whom are located in Chicago.

Aging of Neoprene in a Weatherometer

(*Continued from page* 422)

and to **Patricia L. Bader** and **Joyce Kemmerer** for test results.

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Apparatus for Etching Fine Points

(*Continued from page* 417)

the amount of electrolyte in the loop controls this current; it is initially adjusted to 2 ma for tungsten and drops to about 0.5 ma just before breaking. Etching takes about 15 inutes. The current values and time are not critical.

Note: For further technical details, see Apparatus for etching fine points under controlled conditions, R. A. Schrack and R. C. Placious, Rev. of Sci. Instr., 26, 412 (June 1956). Also see Elektrolytische "Atzung von Kathodenspitzen für das Feldelektronenmikroskop," F. W. Niemeck and D. Ruppin, Zeit. f. Angewandte Physik, 6, 1 (1954).

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Bolt Making—Mass Production of a Precision Product

(*Continued from page* 403)

New Developments

The techniques of bolt manufacturing are constantly being improved. Thread rolling, which produces a bolt of more uniform quality than thread cutting, was used by only a few manufacturers a few years ago. Now, new machines and techniques have made it common practice in the industry. It has virtually replaced thread cutting in smaller diameter bolts. And more recent improvements in the techniques and machinery have made it possible to roll threads economically on bolts up to one inch in diameter.

★ ★ ★

Cold heading has also become more common because of improved techniques and machinery. The process itself is old. The first cold heading machine was designed and built by **William E. Ward** in 1845; it is still in operating condition at **Russell, Burdsall & Ward Bolt and Nut Company's** Port Chester, New York, plant. But only recently have the techniques of cold heading been adapted to mass production throughout the industry.

★ ★ ★

Leading manufacturers of bolts and allied products are continually seeking better ways of producing fasteners without lessening the precision quality required by today's product fabricators. The industry consumes 2 per cent of the nation's steel production; processing that vast tonnage into the 250,000 types and sizes of threaded fasteners made today without increasing costs, requires constant improvements in methods.

A Practical Approach to the Extrusion of Thermoplastics

(*Continued from page* 407)

adequate supply of molten resin at low pressure for the melt zone to feed upon. The large variations in output (15% or more) of the dry solids section are dissipated by flow of melt back through the momentary surges of unmelted resin.

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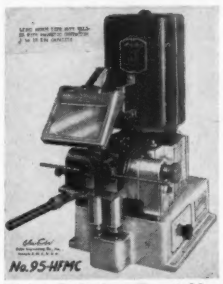

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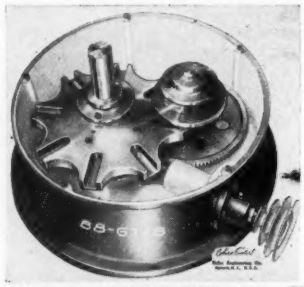

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To connect the feed and melt sections the reduction in channel depth should be accomplished as rapidly as possible to avoid any unnecessary restriction between the two sections. This area of reduction is usually termed the compression section—a misnomer since no actual pressure build-up occurs.

★ ★ ★

It should be noted that two sources of hold-up, disastrous for thermally sensitive resins, can be right at the corner of a channel and at the nose of the screw (Figure 9). If these are filled as indicated this problem is eliminated.

★ ★ ★

Use of these principles in designing a screw results in the familiar metering, or so-called nylon screw (Figure 10). The latter term is certainly a misnomer, for these principles apply equally to all thermoplastics.

★ ★ ★

With a clear understanding of the function of each section of the screw, and the mathematical tools at hand to enable us to closely gauge the performance of each, adjustment of a machine to perform in its optimum manner is readily accomplished. The most important considerations are:

1. **The melt conveying section heaters should not be too hot in order to avoid excessively large temperature gradients in the extrudate.**
2. **The feed section must be hot enough to assure complete melting of the resin before the compression is reached.**
3. **The air in the resin and surface moisture must be expelled through the hopper by keeping the melting zone well to the rear.**

★ ★ ★

To provide a standard against which the performance of an extruder can be compared, a graph of calculated delivery versus pressure at various screw speeds can be made. This requires viscosity and density data for the resin in question. Such data for some wire and cable resins are presented in Figures 11 and 12.

★ ★ ★

When actual production data are superimposed on this graph, as in Figure 13, a complete picture of extruder performance is available. This makes it possible

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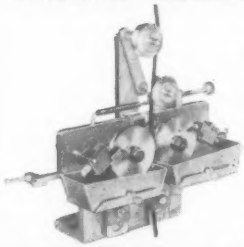

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to quickly gauge the efficiency of the extruder's operation and locate the source of any irregularities which may occur. This goal represents the ultimate objective of the work discussed in this paper.

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Nomenclature

D = diameter of screw, in.
e = land width, in.
h = thread depth, in.
k = die constant
L = length of flighted section in.
m = slope of screw characteristic
N = rotational speed of screw, rev. per sec.
P = pressure in crosshead, lbs. per sq. in.
Q = volumetric delivery of screw, cu. in. per sec.
QD = drag flow, cu. in. per sec.
QL = leakage flow, cu. in. per sec.
QP = pressure flow, cu. in. per sec.
QS = solids flow, cu. in. per sec.
δ = clearance between screw and barrel, in.
μ = viscosity of melt, lb. sec. per sq. in.
ϕ = helix angle, degrees

Automatic Control of Furnaces Used in Wire Processing

(*Continued from page* 411)

months lifetime, and thus lend themselves readily to use in electric furnaces.

Furnace Design and Controllability

It is a fact that many furnaces rely too much on the furnace operator being highly skilled. More elaborate hand control puts the operator either under a great strain, or puts him off to adjust valves or dampers correctly. Where complicated hand control is present the furnace man often assumes that by comparatively

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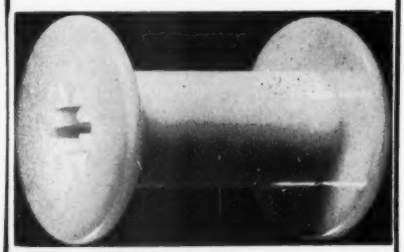

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crude operation he can obtain satisfactory results, which however, is usually not the case.

★ ★ ★

Thus the furnace designer of the future has a great responsibility to make furnace operation not only easier, but also more economical. For example valves must be made accessible right at the side or front of a furnace. Dampers have to be balanced, and easily adjustable, and their position should be visible on a quadrant, and securely fixed. A furnace design which provides some form of interlocking of control gear will ensure correct working. The crude one-leaf damper design, for example, does not effect furnace draught in the same way as a multi-louvre damper type. The wider use of clearly visible valve position indicators is another means to facilitate furnace control. And last, but not least, the furnace of the future will have to be designed not only for metal treatment by hand control, but will have to be evolved for fully automatic control. Thus it will become a controllable machine, fitted with all necessary instruments, and operated away from the vagaries of the "human element."

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Molded Plastic Bobbins and their Relation to Insulated Wire Costs

(*Continued from page* 415)

More investigation—only this time it was materials and designs. What was wanted was a combination which would keep wire from galloping, lagging, being stripped and discoloring — and which wouldn't cost the company a small fortune.

★ ★ ★

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nesium, cast aluminum, pressed steel, wood, plywood-steel composites and with combinations of these materials.

★ ★ ★

Cost of molds for cast materials proved too expensive. Pressed steel bent, rusted and was too heavy. Wood combinations had very short life and, in accelerated tests, threw off chips.

★ ★ ★

Each combination received a disappointing shake of the head until someone suggested reviewing the work previously done in fiber glass and resins. Simplex began to check samples of combinations. Samples were hammered, dropped and boiled.

★ ★ ★

One type of fiber glass bobbin from the **Molded Fiber Glass Tray Company** of Linesville, Pa., best withstood the torturous treatment. It was put through the tests repeatedly and from a material standpoint they were found to be just the thing for which Simplex had been searching.

★ ★ ★

The smooth surface of the fiber glass and resin permitted precise winds that eliminated tangles and wire breaks.

★ ★ ★

Weight for the kind of bobbin that Simplex had in mind was only about a third the weight of steel. This meant that one man could handle a bobbin easily without using a lifting device.

★ ★ ★

Maintenance costs, as far as could be determined at that time, would be practically non-existent.

★ ★ ★

Even the safety angle was considered—operators would not suffer from cuts or splinters.

★ ★ ★

Design of the new bobbin proved gratifying also. Where wood bobbins were 1½ inches thick, fiber glass bobbins, as designed, were only ⅝ inch thick. This meant they'd hold more wire —up to a mile of it.

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Then costs were figured. Fiber glass bobbins were one-third less expensive than steel but two-thirds higher than wood. However, the latter was more than balanced off when bobbin life was compared. Wood bobbins have to be replaced every five or six months. The estimated life of a molded fiber glass bobbin is 20 years.

★ ★ ★

The next move was to contact the manufacturer to work out production details. Since this was a pioneering venture, Simplex wanted to know all about it. They learned some interesting facts.

★ ★ ★

Bobbin flanges are made by laying up eight mats made of chopped strand fiber glass measuring 17 inches in diameter. Six more rings 8½ inches in diameter, are used to build up the thickest part of the bobbin.

★ ★ ★

When this material is permeated with resin, without pigment or filler, the blank is subjected to pressure of 125 pounds per square inch in the bobbin manufacturer's battery of presses.

★ ★ ★

Matched steel dies in each press form the fiber glass and resin into the proper shape. Before the bobbin ends are removed from presses, they are cured by heat of from 260 to 285 degrees F. for about 15 minutes.

★ ★ ★

Testing began two and a half years ago. Since that time, Simplex has put 400 fiber glass and resin bobbins to use. Right now the firm uses only 16-inch bobbins but investigations have opened up possibilities for use of 24-inch bobbins and even for reels five feet in diameter.

★ ★ ★

Simplex still uses wood bobbins and reels for shipment of finished cable to customers because many of the bobbins aren't returned, but the possibility of using returnable fiber glass bobbins for future shipments has not been ruled out.

Universal-Cyclops Appointments

Dr. Harold M. McCullough has joined the Research and Development Department as Research Associate of the **Universal-Cyclops Steel Corp.**, Bridgeville, Pa. Dr. McCullough was previously employed with Sylvania Electric Products, Inc., Bayside, L. I., N. Y. He is a graduate of Ohio State University with a doctor's degree in Metallurgy.

★ ★ ★

Robert D. Crissman has been appointed to the newly created position of Manager of Employment. Mr. Crissman will serve on a corporate basis as a member of the industrial and public relations staff, with functional responsibility for all of the company's employment activities.

★ ★ ★

He joined the company in January, 1956, as Staff Assistant-Employment, after spending ten years with the West Penn Power Company. He was graduated from the University of Pittsburgh in 1942.

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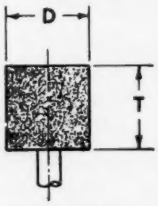

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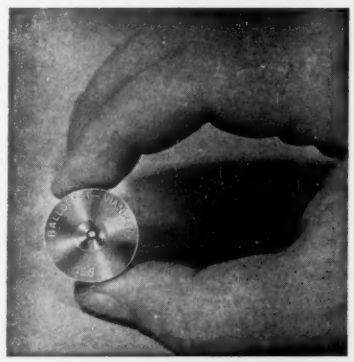
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The Electrical Industry and National Electrical Week

The total electrical industry produced goods and services in 1956 valued at almost $52 billion, or 12½ per cent of the $412.4 billion produced last year by the entire American economy, according to a new statistical evaluation of the industry developed for National Electrical Week.

★ ★ ★

The new information was announced by N. E. W. Chairman **Merrill E. Skinner** in opening the 1957 National Electrical Week observance in the nation's capital. He addressed a trade conference and exposition luncheon sponsored by the Electric Institute of Washington, D. C.

★ ★ ★

Mr. Skinner, who is vice president and director of sales for Union Electric Company, St. Louis, said the N.E.W. Committee felt there was a need to develop a new total evaluation of the size, activity, and value of the electrical industry in the national economy.

★ ★ ★

As a result, the committee appointed an intra-industry task force, representing the major trade associations and assisted by representatives of the trade press. "The task force has done an outstanding job, and we are happy to report the results to the entire industry. More work needs to be done—both in more extended statistical analysis and in eliminating some duplication—but we feel that they have achieved a tremendously significant picture with the work already accomplished," he said.

★ ★ ★

Overall, he reported, the industry looks like this: In 1956, more than 4 million people were directly employed by over 42,600 business establishments whose main functions are the manufacture, installation, operation and maintenance of equipment depending entirely on electric energy for its operation, which includes electric utility companies, electrical equipment manufacturers, electronic and communication equipment manufactur-

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★ ★ ★

To help the user of spring steel make his selection on the basis of all the facts, the **Wallace Barnes Steel Division of Associated Spring Corp.**, Bristol, Conn., has published a new edition of its "Fact Book of Cold-Rolled Spring Steels." This 48-pege brochure is more than a catalog of the sizes, grades, and hardnesses of steel offered by the division; it is a brief course of instruction on the whole subject of spring steel; its essential qualities, the various grades and what each is most commonly used for, and how it is rolled, annealed, slit and filed, hardened and tempered, polished, colored, and inspected (at Wallace Barnes, that is).

★ ★ ★

Copies of the new "Fact Book" may be obtained on request from any Associated Spring Corporation representative or from Wallace Barnes Steel Division, Bristol, Conn.

★ ★ ★

For further information, contact **Kent Putnam**, Advertising Manager, Associated Spring Corporation, Bristol, Conn., or **Frederick R. Brewster**, John Mather Lupton Company, Inc., 420 Lexington Avenue, New York 17, N. Y. (MUrray Hill 9-0950).

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Investment of Foreign Capital in Denmark

The Danish Government has issued a pamphlet under the above title, calling attention to investment opportunities in Denmark.

★ ★ ★

In an accompanying letter it is stated that the wire industry in particular is open for the development in the manufacture of mill and patented steel, copper, brass and aluminum wire.

★ ★ ★

Those interested in receiving a copy of the pamphlet are invited to send for a copy to Carl N. Frandsen, Postbox N. R. 6, Lindholm, Norresundby, Denmark.

Plasticizer Controls Crystallization

Kenflex A, a polymeric plasticizer for Neoprene has proven to be an excellent plasticizer and process aid. Users have observed that when Kenflex was present there was definite control over heat build-up during milling, with resulting freedom from scorch in the factory. Kenflex also has a pronounced effect on the stress relaxation of Neoprene, which accounts in part for the improvement in ozone resistance. Recent data shows a pronounced effect on the control of crystallization of Type W. Neoprene. Retention of tensile strength and elongation after heat aging is greatly improved. This data is available upon request from the **Kenrich Corporation,** 57-02 - 48 St., Maspeth, N. Y.

Develops New Expendible Spool

A new 10-pound throw-a-way spool for book-binding wire has been developed by **Prentiss Wire Mills, Riverside Metal Division.** Applications for this new spool include some of the largest in the bookbinding industry.

★ ★ ★

The throw-a-way spool is wire bound and includes a metal insert in the hub and heavy cardboard sides, a combination of features designed to provide the maximum in security and compactness of packaging. The entire putup is used in conjunction with the Prentiss Model "K"-10# detachable head spool, thus eliminating the expense of solid metal spools, the packing costs and transportation charges that returnable spools necessitate.

★ ★ ★

Prentiss is shipping both liquor-finished and tinned low carbon steel stitching wire on this putup. To date, the throw-a-way spools are used only in 10-pound coils, where long runs without spool changes are desirable. Plans are under way to make available a similar spool for the standard 5-pound coil of stitching wire.

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Montgomery Co., The, Windsor Locks, Conn.

CONTAINERS—Wire Packaging
(See DRUMS—Wire Packaging)

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Plastic Mold & Engineering Co., Providence, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

CORDS—Electrical, Tinsel Conductor
Montgomery Co., The, Windsor Locks, Conn.

COUNTERS—
(See MACHINERY—Measuring Wire and Cable)

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.
Vascoloy-Ramet Corp., Waukegan, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Somerville, Mass.
Robinson, M. W. Co., Rockfall, Conn.

DIAMONDS—Industrial
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Molina-Straus Diamond Products Co., New York, N. Y.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDERS
Danforth, The C. W. Co., Youngstown, Ohio
Elgin National Watch Co., Abrasives Div., Elgin, Ill.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Hyprez Div., Engis Equipment Co., Chicago, Ill.
Indiana Wire Die Co., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
Molina-Straus Diamond Products Co., New York, N. Y.
National Research Company, St. Clair Shores, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIAMOND POWDER RECLAIMING—
Danforth, The C. W. Co., Youngstown, Ohio
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Industrial Diamond Powders, Inc., Pittsburgh, Pa.
Kelly Wire Die Corp., New York, N. Y.
National Research Co., St. Clair Shores, Mich.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.

DIAMOND TOOLS—
Indiana Wire Die Co., Ft. Wayne, Ind.
Metal Carbides Corporation, Youngstown, Ohio
Molina-Straus Diamond Products Co., New York, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES—Carbide, Tungsten & Tantalum
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Cold Heading
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Vascoloy-Ramet Corp., Waukegan, Ill.

DIES—Diamond
Ajax Industrial Supplies, Inc., Ft. Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Ft. Wayne Wire Die Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.

DIES DIAMOND—Drawing Angle Controlled
Hoosier Wire Die, Inc., Ft. Wayne, Ind.

DIES DIAMOND—Reversible
National Wire Die Co., New York, N. Y.

DIES—Extrusion
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Kelloy Corporation, New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Wayne Wire Die Co., Hillside, N. J.
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

DIES—Eyelet
Eastern Carbide Corp., New Rochelle, N. Y.
Kelloy Corporation, New York, N. Y.

DIES—Nail, Nail Cutters, Feeder Blocks, Grippers, etc.
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

DIES—Pointing
Sjogren Tool and Machine Co., Auburn, Mass.

DIES—Polishing, Asbestos Wire
Beard Machine Co., York, Pa.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Boulin, Victor J., Inc., New York, N. Y.
Brenon, Inc., New Brunswick, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hoosier Wire Die, Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corporation, Youngstown, Ohio
Metallurgical Products Dept. of General Electric Co., Detroit.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

National Wire Die Co., New York, N. Y.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Universal Wire Die Co., Cranford, N. J.
Vascoloy-Ramet Corp., Waukegan, Ill.
Wayne Wire Die Co., Hillside, N. J.

DIES—Special Shapes, Etc.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Indiana Wire Die Co., Ft. Wayne, Ind.
Kelloy Corporation, New York, N. Y.

DIES—Swaging
Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing
Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hoosier Wire Die., Inc., Ft. Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Metallurgical Products Dept. of General Electric Co., Detroit.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.

DRAW BENCHES—
(See MACHINERY—Draw Benches)

DRIVES—Electric, Adustable Speed
Allis, The Louis Co., Milwaukee, Wis.

DRUMS—Wire Packaging
Continental Can Company, Van Wert, Ohio
Hubbard Spool Company, Garrett, Ind.

DRUMS & TRAVERSES—For Cable Reels
Hubbard Spool Co., Garrett, Ind.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

DRYING EQUIPMENT—
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

ENGINEERS—Consulting
Wire Mill—Clarence S. Arms, Worcester, Mass.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FREQUENCY CHANGERS—
The Louis Allis Company, Milwaukee, Wisc.

FURNACES—Brazing
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Galvanizing Equipment
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating
Ajax Electric Company, Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Pot (Oil, Gas, Electric)
Ajax Electric Company, Philadelphia, Pa.

FURNACES—Resisting Heating, Strand
Electric Furnace Company, Salem, Ohio

FURNACES—Salt Bath
Ajax Electric Company, Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio

FURNACES—Strand Annealing
Electric Furnace Company, Salem, Ohio

GAUGES—Wire Diameter, Continuous
Industrial Gauges Corporation, West Englewood, N. J.

GALVANIZING EQUIPMENT—(See MACHINERY—Galvanizing Wire)

GEARMOTORS—
The Louis Allis Company, Milwaukee, Wisc.

GRINDERS—Roll
Norton Co., The, Worcester, Mass.

GUIDES—For Wire
Heany Industrial Ceramic Corp., New Haven, Conn.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging
Sjogren Tool and Machine Co., Auburn, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Apex Aikali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INKS—Printing, for Insulated Wire
Entwistle Manufacturing Corporation, Providence, R. I.

INSULATING MATERIALS—
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plymouth Cordage Company, Plymouth, Mass.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

INSULATING MATERIALS—Paper (For Electric Wire Cable)
Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS—See MACH.—Lacquering Electric Wire

LAME—LAHN—
Montgomery Co., The, Windsor Locks, Conn.

LIME—
Warner Co., The. Philadelphia and Bellefonte, Pa.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Company, Harrison, N. J.
Rome Soap Mfg. Co., Rome, N. Y.
Standard Industrial Compounds Co., Frankfort, Ill.
Tri-State Industrial Lubricants, Morton Grove, Illinois.

LUBRICANTS—Wire Drawing
(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope
Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire
Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Braiding
New England Butt Co., Providence, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Capstans and Machinery—Winding Wire)

MACHINERY—Centerless Grinding & Polishing
American Laubscher Corporation, New York, N. Y.

MACHINERY—Chain Making
Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Closing Rope
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod
Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Cook Mfg. Co., The, Paterson, N. J.
Morgardshammer Mek Verstads A. B., Morgardshammer, Sweden.
National Mach'y Exch (Used), New York
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Cutting
Eisler Engineering Company, Newark, N. J.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Descaling Rod, Dry
Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany

MACHINERY—Die Making
Boulin, Victor J., Inc., New York, N. Y.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Metallurgical Products Dept. of General Electric Co., Detroit
Wayne Wire Die Co., Hillside, N. J.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven, Company, Detroit, Mich.

MACHINERY—Extruding
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios Maschinenfabrik, Reutlingen, Wurtt, Germany

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Mfg. Co., Wallingford, Conn.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
American Insulating Mach'y Co., Phila., Pa.
Beard Machine Co., York, Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Labeling Electric Wire
Dewyer, Inc., Libertyville, Ill.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Oven Company, Detroit, Mich.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland
Wafios Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Durant Mfg Co., Milwaukee, Wis.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.

MACHINERY—Plating
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York,
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Polishing Asbestos Wire
Beard Machine Co., York, Pa.

MACHINERY—Printing on Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gillies, Duncan M. Co., Inc., Boylston, Mass.

MACHINERY—Re-Spooling
Emory, Robert J., Co., Newark, N. J.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
National Mach'y Exch. (Used), New York N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Insulating Machinery Inc., Northboro, Mass.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Staple
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen, Wurtt., Germany

MACHINERY—Straightening & Cutting
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Patterson Machine, Geo. C., Co., Cleveland, Ohio

MACHINERY—Stranding
Godderidge Ste., Houilles, (Seine-et-Oise), France
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Stripping Electric Wire & Cable
Burdwood, Howard A., Inc., Portland, Maine

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Division of Franklin Research Corporation, Mystic, Conn.
Entwistle Manufacturing Corporation, Providence, R. I.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Pourtier Pere et Fils, Romainville (Seine) France
Standard Mill Supply Co., Pawtucket, R. I.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Federal Mfg. Co., Wallingford, Conn.
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Universal Industrial Equipment Co., Secaucus, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Cranston, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—Welded Wire Mesh
E. V. G., Richard Kleinhans, New York, N. Y.
Maschinen & Stahl A. G., c/o Richard Kleinhans, Zurich, Switzerland

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot and Machinery —Welding Wire Fabrics)

MACHINERY—Winding Wire
Emory, Robert J., Newark, N. J.
Federal Manufacturing Company, Wallingford, Conn.
Fenn Manufacturing Co., Newington, Conn.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Federal Mfg. Co., Wallingford, Conn.
Fenn Mfg. Co., Newington, Conn.
Herborn, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
Morgardshammer Mek Verstads AB, Morgardshammer, Sweden
National Mach'y Exch. (Used), New York, N. Y.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Superior Tool & Manufacturing Company, Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Larmuth (1947) Ltd., Swinton, England
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

MOTORS—Electric, A.C. & D.C.
The Louis Allis Company, Milwaukee, Wisc.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NIPPERS—Wire Cutting
Robinson, M. W. Co., Rockfall, Conn.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila., Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio
Michigan Oven Company, Detroit, Mich.

OVENS—Rod Bakers
Carl Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Litzler, C. A., Co., Inc., Cleveland, Ohio

PAILS—Packaging (See Drums—Wire Packaging)

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Rinkle, Krinkle Paper Co., Inc., Boston, Mass.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Rinkle, Krinkle Paper Co., Inc., Boston, Mass.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Company, Plymouth, Mass.

PATENT—ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PLASTICIZERS—
Monsanto Chemical Company, Plastics Division, St. Louis, Mo.
Pittsburgh Coke & Chemical Co., Pittsburgh, Pa.

PLASTICS COMPOUNDING—Custom
Plandex Corporation, Downingtown, Pa.

PLASTICS—for Wire Insulation
duPont de Nemours Co., (Inc.), E. I., Polychemical Dept., Wilmington, Delaware
Monsanto Chemical Company, Plastics Division, Springfield, Mass.
Plandex Corporation, Downingtown, Pa.
Shawinigan Resins Corporation, Springfield, Mass.
U. S. Industrial Chemicals Company, Division of National Distillers Products Corporation, New York, N. Y.
United States Rubber Company, Naugatuck Chemical Division, New York, N. Y.

POINTING WIRE
Main, Robert A. & Sons, Inc., Paramus, N. J.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRINTING WHEELS—for Electric Wire
Entwistle Manufacturing Corporation, Providence, R. I.
Gillies, Duncan M. Co., Inc. Boylston, Mass.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

RACKS—Wire Storage
Jarke Manufacturing Co., Chicago, Illinois.

REEL AND TENSION STANDS—
Industrial Ovens, Inc., Cleveland, Ohio
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Machine Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Carris Reels, Inc., Rutland, Vt.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Masonware Company, East Providence, R. I.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., New York, N. Y.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Company The, Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Masonware Company, East Providence, R. I.
McCaskie, Inc., William, Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Company, New York, N. Y.
Nilson, A. H. Machine Co., Bridgeport, Conn.
Republic Steel Corp., Pressed Steel Div., Cleveland, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wood
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., The, Hazardville, Conn.
Carris Reels, Inc., Rutland, Vt.
Durkee Mfg. Co. Inc., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., William, Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.

RODS—Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—RUST Preventing)

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y Inc. (used) Pawtucket, R. I.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—Braider, Wire
Plastic Mold & Engineering Co., Providence, R. I.

SPOOLS—Plastic
Hubbard Spool Company, Garrett, Indiana
Standard Mill Supply, Co., Pawtucket, R. I.

SPOOLS—Stamped Metal for Retail Wire Sales
Masonware Company, East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STOCK STORAGE SYSTEMS
Jarke Manufacturing Co., Chicago, Illinois.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

TABLES—Press Feeding
Jarke Manufacturing Co., Chicago, Illinois.

TANKS—Compound
Watson Machine Co., Paterson, N. J.

TESTERS—INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TOOLS—Wire Cutting
Porter, H. K., Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Adjustable Speed Drives)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VARNISHES & LACQUERS—for Electric Wire
General Electric Company, Alkanex Wire Enamel Dept., Schenectady, N. Y.
Shawinigan Resins Corporation, Springfield, Mass.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila, Pa.
Litzler, C. A., Co., Inc., Cleveland, Ohio
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt and Welding Wire Fabrics
Eisler Engineering Corp., Newark, N. J.
Micro Products Co., Chicago, Ill.
Strecker, August, K.G., Limburg/Lahn, W. Germany

WIRE—Aluminum
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Ball
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Barbed
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass and Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Cadmium
Stamford Processing Co., Peekskill, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Chase Brass & Copper Co., Waterbury, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—For Electrical Conductors
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Flat, Fine
Montgomery Co., The, Windsor Locks, Conn.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Galvanized
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—High Carbon
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Manufacturers
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Seymour Mfg. Company, Phosphor Bronze Div., Seymour, Conn.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
U. S. Steel Corp., N. Y., N. Y.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Metalizing
Stamford Processing Co., Peekskill, N. Y.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Worcester Wire Works Div., National-Standard Company, Worcester, Mass.

WIRE—Needle
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Alloy
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Seymour Mfg. Co., Phosphor Bronze Div., Seymour, Conn.
United Wire & Supply Corporation, Providence, R. I.

WIRE—Oil Tempered
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Pointed
Main, Robert A. & Sons, Inc., Paramus, N. J.

WIRE—Special Shapes
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Spring
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Roebling's John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
United Wire & Supply Corporation, Providence, R. I.
Webb Wire Div., Carpenter Steel Co., New Brunswick, N. J.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Pittsburgh Steel Co., Pittsburgh, Pa.
Webb Wire Div. Carpenter Steel Co., New Brunswick, N. J.

WIRE—Steel—Also Coppered and Galvanized Steel
American Steel & Wire Div., United States Steel Corp., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Crucible Steel Co. of America, Pittsburgh, Pa.
Continental Steel Corp., Kokomo, Ind.
Johnson Steel & Wire Co., Inc., Worcester Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Riverside-Alloy Metal Div., H. K. Porter Company, Inc., Prospect Park, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
United Wire & Supply Corporation, Providence, R. I.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.
Stamford Processing Co., Peekskill, N. Y.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

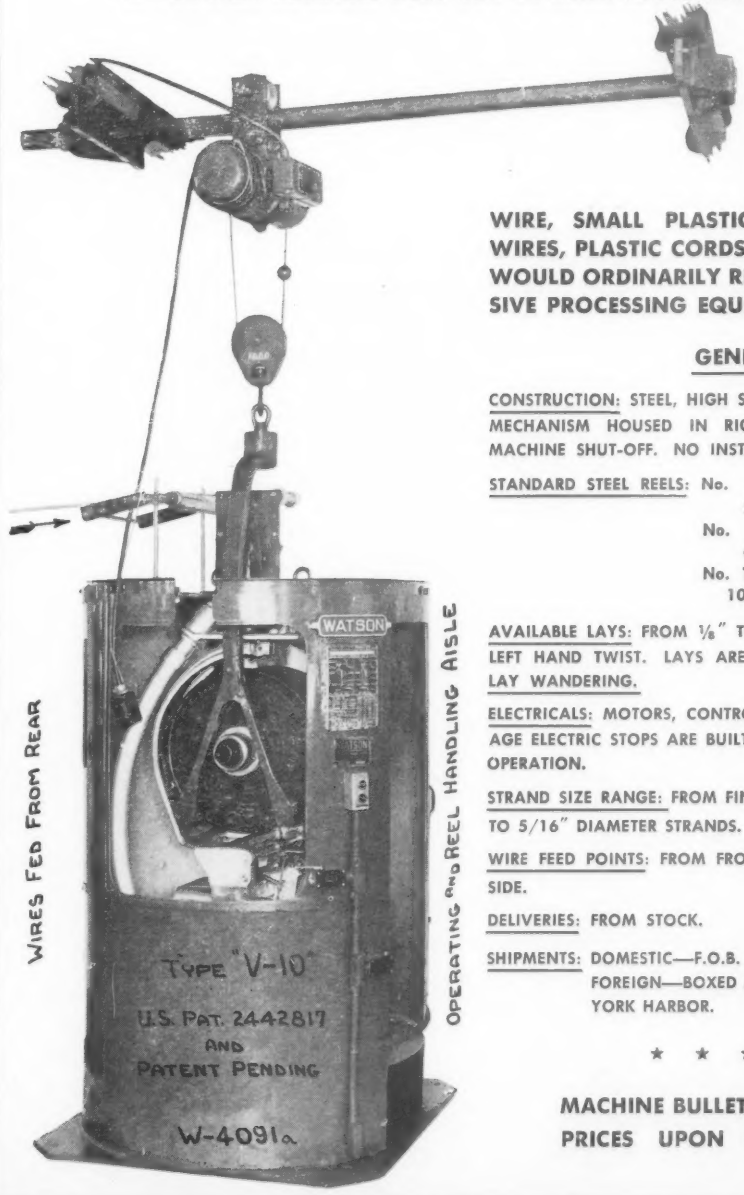
WATSON

VERTICAL BUNCHERS TYPE "V"

THE LEADING DESIGNS WITH AN INTERNATIONAL REPUTATION

NOTABLE ADVANTAGES:

1.—HIGHEST LONG-RUN OUTPUT ON LARGE STANDARD WIRE REELS.
2.—GREATEST COMPACTNESS. IDEAL FOR ROW GROUPING IN LIMITED SPACE.
3.—LABOR-SAVING. ONE OPERATOR CAN SERVE MANY MACHINES.
4.—QUICKEST PARTS SERVICE FROM CATALOGUED STOCK.
5.—LOWEST MACHINE COST DUE TO MASS MANUFACTURE.



SUITABLE FOR ALL COMMON BUNCHING WORK, AND USED ALSO FOR BUNCH-STRANDING AND CABLING OF STEEL AND ALUMINUM CLOTHESLINE, TELEVISION GUY WIRE, SEALING STRANDS, METAL FISH LINES, PAPER CORD, CONTINUOUS TWISTS OF FLAT WIRE, SMALL PLASTIC INSULATED CABLES, ANNUNCIATOR WIRES, PLASTIC CORDS, AND MANY OTHER PRODUCTS WHICH WOULD ORDINARILY REQUIRE THE USE OF MUCH MORE EXPENSIVE PROCESSING EQUIPMENT.

GENERAL SPECIFICATIONS

CONSTRUCTION: STEEL, HIGH STRENGTH ALLOYS AND BALL BEARING THROUGHOUT. MECHANISM HOUSED IN RIGID STEEL FRAME WITH SAFETY DOOR OPENING MACHINE SHUT-OFF. NO INSTALLATION WORK REQUIRED.

STANDARD STEEL REELS: No. 7—16" x 8", 250 LB. CU. CAPACITY
No. 9—22" x 11", 650 LB. CU. CAPACITY
No. 10—24" x 14", 1000 LB. CU. CAPACITY

AVAILABLE LAYS: FROM 1/8" TO 4 7/8". RIGHT AND LEFT HAND TWIST. LAYS ARE FIXED AS SET. NO LAY WANDERING.

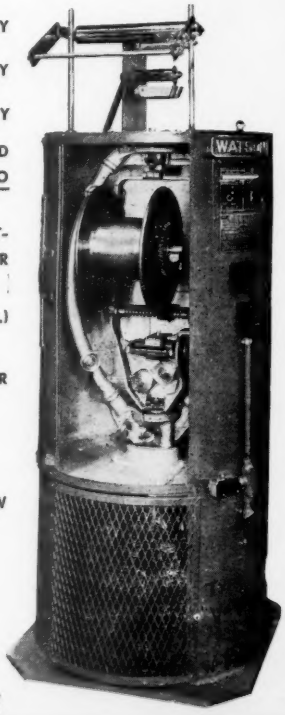
ELECTRICALS: MOTORS, CONTROLS AND LOW VOLTAGE ELECTRIC STOPS ARE BUILT IN AND WIRED FOR OPERATION.

STRAND SIZE RANGE: FROM FINE (7 x #30 B. & S.) TO 5/16" DIAMETER STRANDS.

WIRE FEED POINTS: FROM FRONT, REAR OR EITHER SIDE.

DELIVERIES: FROM STOCK.

SHIPMENTS: DOMESTIC—F.O.B. PATERSON, N. J.
FOREIGN—BOXED & DELIVERED TO NEW YORK HARBOR.



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MACHINE BULLETINS AND PRICES UPON REQUEST

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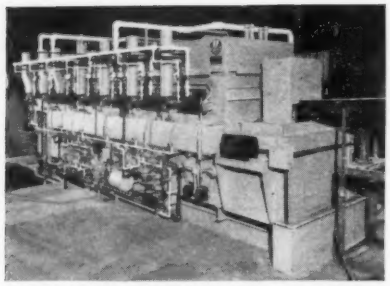
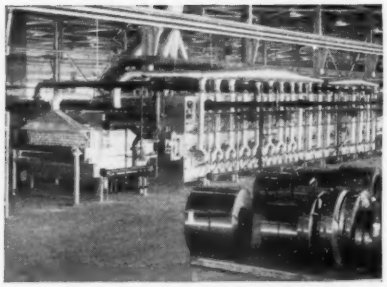
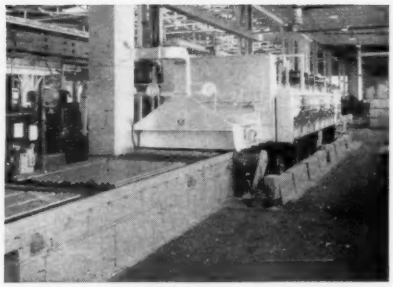


Carbonitriding, carbon correction, carburizing, scale free hardening and other processes are handled uniformly, economically and continuously in EF furnaces.

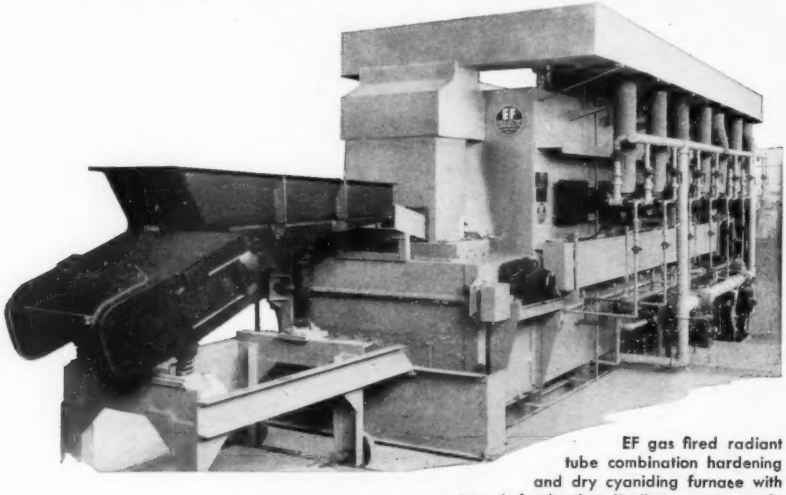


EF gas fired unit—bright anneals wide or narrow strip in single or multiple strands. Other continuous and batch types for ferrous or non-ferrous, including stainless.



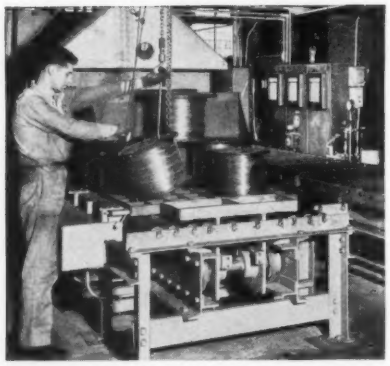
Tubing, strip, rod and wire in coils, strands or on reels are being uniformly processed in hundreds of EF continuous and batch type furnace installations.

PRODUCTION FURNACES



EF gas fired radiant tube combination hardening and dry cyaniding furnace with automatic feeder that distributes parts evenly on conveyor; and a dual oil, water quench.

give you the jump on competition



Charging end of EF special atmosphere bulkhead pusher furnace; bright anneals copper and copperweld wire and clean anneals brass wire. Capacity 4000 lbs. per hour.

● Correctly designed to meet your specific requirements;—built in our own plant under exacting controls and supervision, and incorporating the most advanced heating practices, EF furnaces assure users the utmost efficiency and economy of operation.

The day after day, and month after month dependability of operation fully up to rated output; and ease of control, make EF furnaces the logical choice for installation in continuous "automated" processing lines, giving users the many advantages of this modern manufacturing technique.

Unvarying uniformity of finished product simplifies and reduces the costs of subsequent forming, fabricating and finishing operations, further reducing the cost of the completed product and improving your competitive advantage.

Whether yours is a problem of annealing, normalizing, carburizing, brazing, coating, nitriding, sintering, aging, or any other treatment of ferrous or non-ferrous products, You'll find . . .

it pays to submit your production furnace problems to experienced EF engineers.

THE ELECTRIC FURNACE CO.

GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

Canadian Associates • CANEFCO LIMITED • Toronto 1, Canada